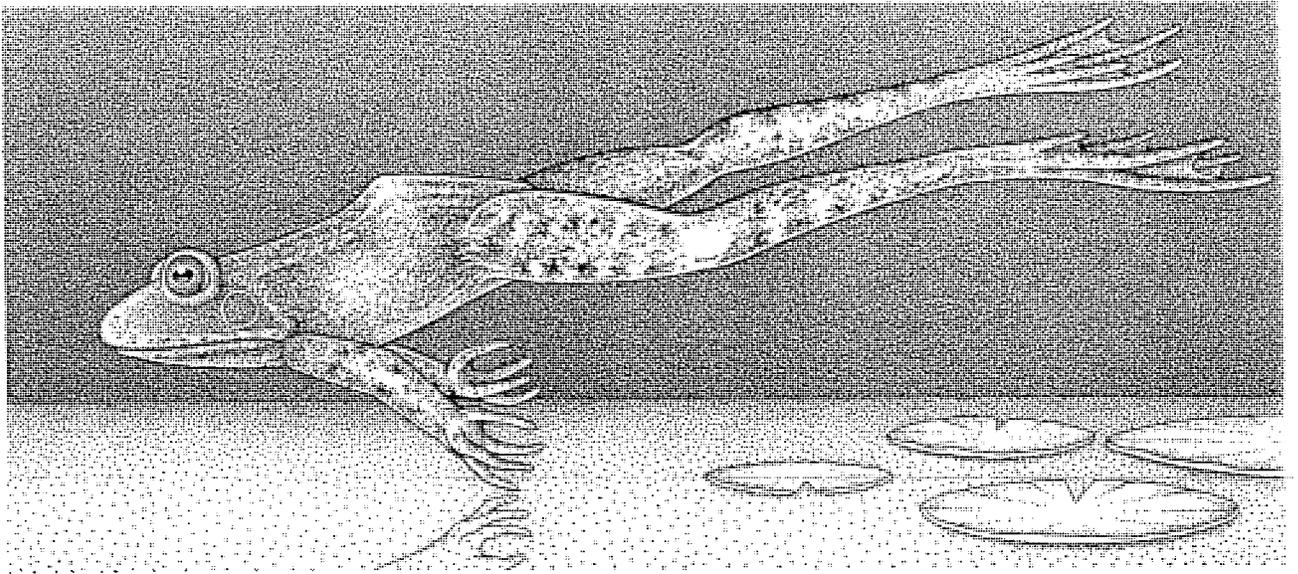


Chapter IV

Environmental Consequences



CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

Environmental consequences are the estimated physical, biological, social and economic effects that would result from implementing each of the alternatives described in Chapter II. The analysis of these effects provides a basis for comparing the alternatives.

This chapter describes the projected direct, indirect, and cumulative effects of the alternatives and summarizes the planned mitigation measures. It also describes conflicts between the effects of the alternatives and other plans and policies. Figures and text often refer to the planning period which could be as long as 15 years. Implementation of any alternative, and thus resultant effects are contingent on available funding.

The environment can be directly changed by activities included in a given alternative (e.g., riparian habitat may be affected by streamside campground construction). Changes to one aspect of the environment may trigger changes in other environmental factors (e.g., changes in riparian habitat resulting from campground construction may affect adjacent fish habitat). These are termed indirect effects. Cumulative effects are those which result from the total actions taking place on Forest lands and neighboring lands for the foreseeable future. Mitigation measures are activities planned to prevent, rectify, compensate for, or reduce projected adverse effects on the environment. Most effects are described qualitatively; some may be described quantitatively.

All activities with an environmental effect are grouped under major headings which include: recreation (which may include actions such as facility and trail construction, opening/closing an area to ORVs), plant and wildlife habitat management (which may include actions such as thinning timber stands, burning meadows to maintain early seral stages), fish habitat management (which may include actions such as fertilizing lakes, placing artificial structures), wetlands management (which may include burning to maintain early seral stages, excavating ponds), vegetation management (which includes actions such as breaching the foredune, hand pulling European beachgrass), RNA allocation, and Wild and Scenic River designation. More detailed descriptions of the types of actions called for in each alternative can be found in Chapter II.

In cases where information was unavailable or incomplete, assumptions were made about resource trends or relationships between resources. All assumptions used in determining the effects of alternatives on resources are outlined at the end of each section. In no case was unavailable or incomplete information essential to making a reasoned choice between alternatives; all information needs are also detailed at the end of each section.

CHANGES BETWEEN DRAFT AND FINAL

Recreation Section

Effects of alternatives on dispersed camping opportunities are included in Figure IV-1.

The discussion of the effects of vegetation management on recreation is expanded.

The effects of Alternative F(PA) on proposals for changes in beach management are more fully explained.

The preferred alternative [F(PA)] no longer has the effect of closing the Siltcoos corridor to ORV use.

The cumulative effects discussion is expanded to acknowledge that ORV use displaced from the NRA may cause adverse impacts on other ORV riding areas.

The potential effects of recreation on municipal watersheds (south of Tenmile Creek) is added to the Effects of Recreation on Other Resources section.

Plant Com- munities & Wildlife Habitat

Additional discussion of potential environmental effects associated with European beachgrass management as proposed in Alternative F(PA).

Comparison of Alternatives concerning protection of globally significant plant communities and sensitive plants was added.

Increased discussion of potential impacts to sand dunes.

Analysis of potential impacts to newly discovered *Daphnia* species.

Increased discussion concerning biodiversity and habitat fragmentation.

Changed miles of remote beach in Table IV-7.

Recomputed acres of wetland interface for all alternatives in Figure IV-4.

Fish Section It was clarified that angling regulations and habitat restoration would be used to preserve the valuable wild stocks of anadromous salmonids.

Watershed Section Relationships between amount of vegetation and quality of groundwater were mentioned.

Effects of European beachgrass control were discussed in some detail.

Social and Economic Setting Discussion on costs for non-native vegetation control was modified.

MITIGATION COMMON TO ALL ALTERNATIVES

Any use or management of Oregon Dunes NRA lands will have some adverse impacts. Mitigation measures are actions, policies or procedures intended to avoid, minimize, rectify, reduce, eliminate or compensate for these adverse effects. Many mitigation measures are built into the standard procedures and policies used by the Forest Service in its day-to-day management of the Oregon Dunes NRA. Long-range planning, facility design, and operation standards are intended, at least in part, to mitigate potential adverse impacts that could result without such forethought. This policy and procedural level of mitigation is common to all of the alternatives considered in this Final Environmental Impact Statement (FEIS).

Management area allocations serve an important mitigation role through separation of competing uses. Additional mitigation measures are prescribed in Forest-wide Standards and Guidelines (S&Gs) developed during the Siuslaw National Forest planning process (Appendix C of the FEIS and Chapter III of the Dunes Plan). These S&Gs, which apply to all the management units of the Forest including the Oregon Dunes NRA, were reviewed by the Interdisciplinary Team (IDT) during this planning process. Although some of the Forest-wide S&Gs have no, or limited, applicability to the Oregon Dunes NRA, all comprise mitigation common to all of the alternatives considered in this action.

The IDT also identified more specific mitigation measures which may apply to one or more (but not necessary all) alternatives (Appendix C of the FEIS or Chapter III of the Dunes Plan). Project level mitigation measures which could be applied are also discussed, when appropriate, in various sections in Chapter IV, Environmental Consequences. The potential effectiveness of mitigation measures are described, unless measures are to be applied at the project level in which case effectiveness cannot be determined until project planning begins.

ENVIRONMENTAL CONSEQUENCES ON RECREATION

Direct and Indirect Effects

The alternatives are designed to provide varying mixes of recreation settings, varying types and amounts of other resource emphases, and varying recreation management standards and philosophies. This variation results in the alternatives having different effects on:

- recreation opportunities available;
- anticipated and potential recreation use levels; and
- current management problems identified by users and managers that degrade recreation experiences.

Effects on Recreation Opportunities

Alternatives would affect recreation opportunities primarily through the recreation settings each alternative provides and the types and amounts of other resource emphases each prescribes (Figure IV-1). Recreation settings, as defined in the Recreation Opportunity Spectrum (ROS) system of classification, set standards for the type and amount of access and facilities provided, recreation activities (experiences) provided, and management control and information provided.

Mix of Recreation Settings - The mix of recreation settings would affect the types and amounts of specific recreation opportunities and experiences available at the Oregon Dunes NRA. Alternatives that would provide higher levels of Rural (R) settings (Alternatives A, B, F(PA), G) would increase opportunities for activities such as overnight camping, viewing wildlife or scenery from a developed facility, watching the ocean from a vehicle or a viewing structure, and visiting interpretive sites/centers. There would be more opportunity to use and experience the Oregon Dunes NRA in a low-risk way with the security of designed and managed facilities and many other users nearby.

Alternatives that provide higher levels of Roaded Natural (RN) settings (Alternatives A, B, C, G, H) would include more opportunity for activities such as walking/hiking/bicycling on easy trails, riding ORVs (except Alternative H) near road corridors, and fishing/wildlife viewing close to road corridors. RN settings would provide opportunities to use and experience the Oregon Dunes NRA in a more self-reliant and less managed/regulated way than R settings, but usually with the security and convenience of designed facilities and other people nearby.

Alternatives that provide higher levels of Semi-Primitive Motorized (SPM) settings (Alternatives A, C, G) would provide more opportunities for activities such as riding ORVs in open sand areas, ORV trail riding in vegetated areas, ORV-accessible

wildlife viewing/fishing, or ORV-accessible interpretive sites/routes. SPM settings would allow people to use and experience the Oregon Dunes NRA in a motorized and highly self-reliant manner. They would be in relatively remote and minimally disturbed areas with few to moderate numbers of other people and few management controls present.

Figure IV-1. Effects of alternatives on various recreation opportunities as compared to existing condition.

Recreation Opportunities	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Developed/ Facility Based	Many More	Many More	Same	Less	Many Less	More	More	Same
ORV	More	Less	Same	Less	None	Same	More	None
Non-motorized	Less	Many More	Same	Less	Many Less	More	Same	More
Interpretive	More	More	Same	More	Less	More	More	More
Remote, quiet	Less	Less	Same	Many More	More	More	Less	More
Easy/Safe	Many More	Many More	Same	Same	Less	More	More	More
Higher risk	More	Same	Same	More	Many More	More	More	Same
Wildlife/Fish	More	More	Same	Many More	Less	More	More	More
Dispersed Camp Motorized	More	Less	Same	Less	None	Less	More	None
Dispersed Camp Non-Motor	Less	More	Same	Less	Less	Same	Less	More

Alternatives that provide higher levels of Semi-Primitive Non-Motorized (SPNM) settings (Alternatives B, D, H) would provide more opportunities for activities such as hiking/horseback riding away from road corridors, foot/horseback/bicycle accessible wildlife viewing/fishing, hike/horse/bike-in camping, and remote exploration and scenery viewing. SPNM settings would provide opportunities to use and experience the Oregon Dunes in a highly self-reliant manner with few management controls or other users present in these relatively remote, largely undisturbed areas.

Alternative E would provide the highest level of SPNM settings, but is different from all other alternatives because it also greatly reduces maintained roads, trails

and access points into much of the Oregon Dunes NRA. Without these improvements, seasonal flooding, thick brush and dense forests would make access to large portions of the area difficult for many people. The result would be that even though the SPNM settings would be increased, the level of recreational opportunities would likely be lower than under any other alternative, due to the extreme difficulty of access. SPNM settings in Alternative E would provide opportunities to use and experience the Oregon Dunes NRA in an extremely self-reliant manner with very few management controls or other users present. These areas would be very remote and largely undisturbed.

Alternative F(PA) includes similar amounts of both SPM and SPNM settings. It provides a balanced mix of motorized and non-motorized recreation opportunities in undeveloped settings.

Other Resource Emphasis Areas - Lands managed for other resource emphases (for example, plant and wildlife habitat, wetlands, Research Natural Areas, etc.) would also contribute to the spectrum of recreation settings and opportunities represented at the NRA. Generally, across all alternatives, lands allocated to other resource emphases would favor recreation uses that involve few people and low impacts to physical and biological resources. These areas would also favor non-motorized over ORV recreation. Where ORV use is permitted within management areas emphasizing other resources, use would be limited in amount and restricted to designated travel routes. Thus, areas emphasizing resource uses other than recreation would generally contribute to SPNM settings; SPM settings to a lesser extent; and only rarely to RN or R settings.

Larger areas emphasizing fish, wildlife and plant habitat proposed in Alternatives D, F(PA), G and H would contribute primarily to the SPNM setting because highly developed settings (R), easily-accessed settings (RN) and motorized settings (SPM) are generally less compatible with habitat management objectives and may result in more human disturbance and greater impact to, and fragmentation of, habitat areas. Alternatives A, B, C, and E propose relatively small areas of fish, wildlife and plant habitat management. These smaller allocations would not affect recreation settings, but could, as in the case of fish or snowy plover habitat management, affect the recreation opportunities available in the localized areas of management. For example, fishing opportunities would be enhanced at some lakes, while ORV riding or hiking/walking opportunities would be restricted in areas being managed as snowy plover nesting habitat.

Wetlands management (MA 10G) levels proposed under any of the alternatives would not affect recreation settings for the current planning period. Because Federal law prohibits wetland degradation, wetlands (whether they are actively managed or not) are not prime areas for recreation development and thus contribute primarily to the SPM and SPNM recreation settings. To meet legal wetland protection requirements, ORV use in wetland areas (SPM) would be limited in amount and restricted to designated travel routes under all alternatives.

The primary effect of wetland management levels proposed under the alternatives would be on future (beyond this planning period) recreation settings. Alternatives with higher levels of wetland management (Alternatives D, F(PA), H) maintain more wetland acres over time, reducing future options to develop those areas into higher development/access recreation settings (R or RN). Alternatives with fewer acres of managed wetlands (Alternatives A, B, C, E, G) would permit more wetland areas to evolve into non-wetlands thereby increasing the possibility of developing them in future planning periods.

Proposed research natural areas (RNAs) would contribute acres to the SPNM setting in Alternatives B, D, E, F(PA), and H but not to R, RN or SPM because the level of environmental impact associated with these latter settings is incompatible with RNA management objectives. Alternatives which allocate both RNAs for establishment (Alternatives E, H) would contribute more acres to SPNM than alternatives which allocate only 1 RNA for establishment (Alternative B, D, F(PA)). Alternative F(PA) would allocate a smaller RNA, but this will not reduce SPNM acreage in the area because that portion not allocated as RNA would still be managed for SPNM recreation opportunities. Alternative C would defer proposing either area for RNA status until the next planning period, but their eligibility would be maintained and they would continue to be managed as SPNM recreational settings.

River designations of wild or scenic (Alternatives D, E, F(PA), H) would preclude future options to manage those river corridors as R or RN recreational settings because the amount and types of facilities and access associated with these latter settings would be inconsistent with the desired conditions prescribed by Wild or Scenic designation. Non-designation or a designation as recreational (Alternatives A, B, G) would have no direct effects on recreation settings, but could indirectly effect settings by allowing additional development that would ultimately reduce the amount of SPM and/or SPNM settings. Maintaining eligibility (Alternative C) would have the same effect as designation at the level at which the river is currently eligible. For example, rivers classified as wild or scenic, such as Tahkenitch and Tenmile, would have to be managed to preserve that eligibility and would therefore not be developed to provide R or RN recreational settings.

Surface Water Levels - Reduced surface water levels have been observed and documented for 10 years in portions of the NRA. If this trend continues, major long-term impacts on recreation opportunities including angling, canoeing, scenery viewing, waterfowl hunting, and wildlife viewing could result. Under any of the alternatives, fully implementing the special use permit regulating ground water pumping from the Dunes aquifer could eliminate or at least reduce this effect.

Vegetation Management - Another factor effecting recreation opportunities is the spread of vegetation across much of the Oregon Dunes NRA. The continued spread of European beachgrass and other vegetation would, in time, lead to the loss of many unique recreation opportunities dependent on, or enhanced by, the characteristic open, unvegetated sand dunes. These opportunities include ORV riding, sand surfing, unique hiking and scenery viewing. All alternatives except C and E include

plans to control European beachgrass. Acreages planned for beachgrass control and other vegetation management activities are the greatest under Alternative F(PA). Alternative F(PA) identifies areas where vegetation could be managed for visual and recreation purposes. If fully and successfully implemented, it would do the most to slow or reverse the spread of vegetation, and thus the most to maintain recreation opportunities that benefit from an open sand environment.

Beach Management - Beach-related recreation opportunities on State lands would also be effected by the alternatives. NRA roads and parking lots provide the primary access to State-managed beaches along the entire length of the NRA. Alternatives D, E and H would reduce access to the beach by shortening roads and eliminating parking lots. Alternative E would reduce access the most by eliminating 5 of the 6 South Jetty parking lots and the northern portion of South Jetty Road. It would also shorten Siltcoos, Horsfall and Threemile roads. Alternative D would also eliminate South Jetty Road and parking lots and would shorten Siltcoos Road. Alternative H would convert Threemile Road to a foot/bicycle access once inside the NRA boundary. Alternatives A and B would increase beach access by constructing a paved road the length of the North Spit of the Umpqua River and (Alternative A) and upgrading Threemile Road (Alternative B).

If Alternatives A, B, D, E or H were implemented, the NRA would recommend to the State that beaches be managed consistent with NRA upland management in regard to vehicle access. This action would change beach recreation opportunities. Depending on the alternative and the State's concurrence, additional beach areas could be either opened or closed to vehicle access. With state concurrence more beach open for motorized use under Alternative A and less would be open for motorized use under B, D, E and H. Alternative F(PA) would, pending state concurrence, close approximately 5 miles of beach currently open for motorized use and restrict motorized use to certain vehicle types and seasons on South Jetty and N. Spit Umpqua beaches.

Effects on Recreation Use

To accurately predict the effects of alternatives on future recreation use of the Oregon Dunes NRA, the specific supply-demand relationship for recreation settings and opportunities must be understood. This relationship is not clear, but certainly depends on several factors beyond the scope of this planning effort and the control of the Forest Service including: larger questions about the place of outdoor recreation in the total spectrum of leisure time activities available; the place of NRA recreation opportunities in the spectrum of opportunities along the entire Oregon coast or even across the nation; changes in outdoor recreation activity preferences over time; and changes in regional or even nationwide travel patterns over time.

Because supply-demand information is incomplete, assumptions about future demand must be made to determine the effects alternatives will have on recreation use (see Assumptions Used to Predict Environmental Consequences on Recreation in this section). These assumptions include expectations that recreation use will slowly

increase during the planning period, that use will, at some point, exceed existing facility capacity, and that use patterns would remain fairly constant over time.

Accurate information about existing use levels in undeveloped settings (SPM and SPNM) and the capacity of such settings is also lacking. Without this information, it is not possible to precisely predict capacity available in the future under various alternatives. Collecting this information and refining use-capacity ranges for undeveloped settings would be a recreation management priority in all of the alternatives, except C.

The more precise and detailed, but incomplete information mentioned in the above paragraphs would be helpful in more fully assessing the effects of the alternatives. It is not, however, essential to making a reasoned choice among alternatives because that level of understanding of effects is seldom available and has not proven necessary in similar past decisions. Historic and current trends and current use pattern information is available and has proven adequate for similar past decisions.

Based on these factors, estimates of use levels for each alternative are necessarily very general. Recreation use is determined in part by the overall capacity of the Oregon Dunes NRA. In turn, overall capacity is a function of the type and amount of recreation settings provided within different alternatives.

Desired conditions within the more developed recreation settings, such as R and RN, allow higher concentrations of users than the less developed settings, such as SPM or SPNM. Thus, alternatives with greater amounts of R and RN settings (Alternatives A, B, G) would result in a higher overall capacity for the NRA. Alternatives with fewer acres of R and RN settings (Alternative D, E, F(PA), H) would result in less capacity.

In designing the alternatives, the IDT assumed that recreation use at the NRA could increase by 30-50% over a 10-15 year period. Based on the designed intent of the alternatives and the level, type and amount of facilities and access planned, use would probably be highest under Alternative A. Alternative B would probably result in more modest use increases and Alternative G in more modest increases still. For Alternatives F(PA) and H, the IDT assumed that use would increase moderately (increasing 15-30% over a 10-15 year period) up to the capacity of the developed facilities. Alternatives D and E would increase the total amount of semi-primitive settings (SPM + SPNM) and thereby decrease the theoretical capacity of the entire NRA. We assumed that Alternative D would continue use at about the current level. Alternative E would reduce many of the developed facilities and much of the access into the interior portions of the NRA. We assumed that with most access, developments and amenities focused along Highway 101 recreation use would decline perhaps as much as 50% over the planning period.

Managing lands for other resource emphases would affect recreation use levels through their effect on the recreation settings as discussed in the previous section. Additional recreation use standards (such as night-riding curfews, stricter ORV

noise goals, dispersed camping restrictions, etc.) in all alternatives, except Alternative C, would change the nature of some current recreation opportunities and experiences. This, in turn, may promote or constrain growth in use. However, the exact effect cannot be predicted. Use limits for recreation settings would also be established under all alternatives, except Alternative C. Eventually these use limits for specific settings would constrain total use of the NRA when all settings are 100% used. No information is available to predict when this capacity point would be reached.

Effects on Current Management Problems

The alternatives were designed to address several current recreation management problems and opportunities (Figure IV-2). Four primary factors which degrade the quality of recreation experiences were identified by user groups and NRA managers during the issue-identification phase of this planning effort. These concerns are: 1) crowding is causing unsafe riding conditions in ORV riding areas and developed facilities; 2) mixing ORV and non-motorized recreationists in the same setting(s) is resulting in unsafe and unpleasant recreation conditions; 3) noise from ORVs is not confined to ORV-open areas and degrades recreation experiences of non-motorized visitors and 4) lack of coordinated management between State-managed beaches and Forest Service-managed uplands is resulting in confusion and degraded recreation experiences. Alternative C, the No Action alternative would continue current management and thus do little to address any of these problems or opportunities, except as noted below.

Crowding and Unsafe ORV Riding Conditions - Under current or even moderately increased use levels, crowding and unsafe riding conditions for ORV recreationists would be reduced under Alternatives A and G. These alternatives would open up more area (RN and SPM) for ORV riding, allowing riders to spread themselves out in undeveloped portions of the NRA. These alternatives would also develop more facilities, such as campgrounds and staging areas for ORV users. This would reduce perceptions of crowding in the developed settings (R and RN) while spreading access to, and hopefully rider distribution within, the undeveloped riding areas.

In addition, all alternatives except C would establish use limits in SPM settings (see Management of Recreation, Chapter II). Such limits are designed, in part, to increase ORV-rider safety. This would result in safer riding conditions even in Alternatives B, D and F(PA) which reduce the amount of available riding area. Similarly, enforcement of designed capacity limits in developed settings serving ORV users should alleviate crowding even under those alternatives that reduce ORV-focused facilities (Alternatives B, D, F(PA)). Other administrative tools such as zoning for different levels of use or ability, issuing permits for peak use periods, and implementing more stringent safety and ORV use standards would also remain available under any alternative as means of reducing crowding and unsafe riding conditions.

Alternatives that would implement designated travel routes through undeveloped (SPM) vegetated areas (Alternatives A, B, C, D, F(PA) and G) may also increase

safety and reduce perceptions of crowding for some users because more riding opportunities would include visual screening from other users and would emphasize slower speeds.

Mixing of ORV and Non-Motorized Recreationists - Mixing ORV and non-motorized recreationists is a source of concern for users from both groups. Mixing ORV riders and hikers/horseback riders in the same areas (RN and SPM settings) can be an unsafe situation for all parties. Also, mixing uses within the same corridors, campgrounds, and day-use facilities may degrade recreation experiences due to noise, fumes and unsafe situations.

Alternatives A, B, C, D, F(PA) and G would clearly designate areas where ORVs could operate. Beyond such designations and diligent efforts to clearly inform people of those designations, the Forest Service has no authority to close ORV use areas to non-motorized recreationists. As a result, the mixing of uses in some undeveloped areas may remain a concern under all alternatives, except Alternatives E and H which would close the entire NRA to ORV use.

Alternatives B and D would increase the physical separation between ORV and non-motorized recreationists. These alternatives would close all or portions of some developed corridors to ORV operation. Visitors with ORVs would be permitted to use facilities, but would not be allowed to operate their ORVs within these areas. Alternative G and F(PA) closes some facilities, but not entire corridors to ORV operation. It would provide less use-separation, than Alternatives B and D, but more than currently exists (Alternative C) and more than Alternative A.

Increased separation of ORV and non-motorized uses in developed (R and RN) settings would reduce problems for some recreationists by alleviating adverse impacts from noise and fumes. It would also reduce the unsafe situations resulting from mixing ORV and non-motorized recreationists in the same developed areas. In addition to separating uses in some developed corridors, Alternatives B, D, F(PA) and G would also establish quiet hours (10 p.m. to 6 a.m.) within some campgrounds. This would alleviate concerns of both ORV and non-motorized users disturbed by nighttime ORV engine or RV generator noise. Alternatives A and C would continue to allow 24-hour operation of engines in NRA campgrounds.

Alternatives A, C, and G would continue to mix ORV and non-motorized recreationists within all NRA corridors and in all, or many of, the developed facilities along these corridors. Under Alternative A some of the currently non-motorized facilities along Highway 101 would be converted to an ORV focus. Existing concerns of both user populations would likely persist. Some could be alleviated by constructing designated routes designed to remove ORV from roadways, but ORVs and passenger vehicles would continue to share the same roadways within campgrounds and developed day-use facilities. Administrative authorities, such as imposing curfews and enforcing quiet hours would still be available should it become desirable or necessary in the future to address noise concerns. Alternative F(PA) would keep all NRA corridors open to both ORV and non-ORV use, but would better separate

uses among various facilities in the corridors. It would also close corridor roads to ORV use, thereby alleviating the mixing of ORV and highway vehicles on the same roadways.

Alternatives E and H would increase the quality of recreation for some non-motorized recreation users. Mixing ORV and non-motorized recreation would not occur because the entire NRA would be closed to ORVs. However, under Alternative E reduced passenger vehicle and trail access into many of the interior and undeveloped portions of the NRA would make access more difficult and probably increase the quality of experience for those recreationists seeking quiet, solitude and a feeling of remoteness. Some, perhaps many, non-motorized recreationists would be unable to experience the interior portions of the Oregon Dunes because of the difficulty of access and facilities. Recreation access to beaches along the Oregon Dunes portion of the coast would be most restricted under this alternative.

Off-Site ORV Noise - Alternatives E and H would eliminate the problem of off-site ORV noise by closing the NRA to ORV use. Alternative C would do nothing to alleviate this problem. Alternatives B and D would reduce off-site ORV noise by imposing campground quiet hours, night-riding curfews in limited areas, and noise-reduction buffers along portions of the NRA boundary. Alternatives A and G would reduce off-site noise only slightly by imposing quiet hours in many campgrounds. Alternative F(PA) while less effective than E and H, would be more effective than all other alternatives in reducing off-site ORV noise. Alternative F(PA) would impose quiet hours in all NRA campgrounds, establish night-riding curfews in 2 of the 3 areas open for ORV use, establish a noise-reduction buffer in the Woahink-Cleawox lake area, and establish stricter ORV noise goals for the NRA. This alternative would require ORVs which currently operate at 99 decibels (dB) to operate at 95 dB by 1997 and at 90 dB by 1999. Reduced decibel outputs from ORVs would significantly reduce off-site noise impacts.

Beach - Upland Management Coordination - All of the alternatives, except Alternative C, F(PA) and G would recommend to the State that beaches be managed consistently with adjacent Forest Service uplands in terms of being open or closed to ORV use. This coordination would alleviate problems of noise, unsafe mixing of uses, and degraded recreation experiences for people who inadvertently change recreation setting by crossing jurisdictional boundaries. Alternatives C and G would make no additional efforts at coordination. Alternative F(PA) would strive to improve management coordination over the current situation, but not make upland and beach management entirely consistent with regard to motorized access. It would, pending concurrence from the State, close beaches currently open to motor vehicles south of the Siltcoos River and south of Horsfall Beach parking lot to the national forest boundary. It would also, again pending concurrence from the State, limit access to N. Spit Umpqua beach and seasonally-open South Jetty beach only to street legal class II vehicles (600-8000 pounds GVW) or ATVs for people with disabilities.

Figure IV-2. Effects of alternatives on current management problems compared to existing condition.

Recreation Problems	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of mixed uses on roads	Less	Less	Same	Less	None	Less	Less	None
Amount of mixed uses in campgrounds	Same	Less	Same	Less	None	Less	Less	None
Amount of mixed uses in undeveloped areas	Same	Same	Same	Same	None	Same	Same	None
Amount of night-time campground noise	Same	Less	Same	Less	None	Less	Same	None
Amount of off-site ORV noise	More	Less	Less	Less	None	Less	Less	None
Degree of crowding in ORV developed sites	Less	More	Same	More	N/A	Same	Less	N/A
Degree of ORV crowding in undeveloped areas	Less	More	Same	More	N/A	Same	Less	N/A
Amount of ORV trespass on private land	Same	Less	Same	Less	None	Less	Same	None

Cumulative Effects

The demand for recreation at the Oregon Dunes NRA is affected not only by Forest Service actions, but also by other coastal outdoor recreation providers. These include private providers in the immediate vicinity of the Oregon Dunes NRA; the Oregon Parks and Recreation Department; and Lane, Douglas and Coos counties. State projections indicate coastal destination recreation is growing and yet neither the State of Oregon nor any of the adjacent counties have current plans to increase their coastal recreation facilities or capacities during the next 10-15 years (J. Phillips, pers. commun. G. Combs, pers. commun. R. Berry, pers. commun.). The seasonal nature of outdoor recreation along the coast makes it difficult for many potential private providers; there are no known major increases in private capacity planned in the areas immediately adjacent to the NRA.

The Oregon Dunes NRA is widely known as a premier ORV riding area. It currently attracts significant ORV use from as far away as Washington and California. Without private, state, county or other federal development of additional ORV riding areas elsewhere in Oregon or in neighboring states, this use could reach a capacity point at the Oregon Dunes NRA within the planning period. Continued development of ORV staging and rental facilities on private land adjacent to the NRA boundary could increase ORV use of open areas and hasten the need for management strategies (e.g. permits) to keep use levels within available capacity. ORV use displaced from the Oregon Dunes NRA, as a result of management changes or capacity considerations, could contribute to crowding and experience degradation in other riding areas.

Many visitors to the Oregon Dunes NRA are touring the Oregon coast via Highway 101 and the NRA is one among several destinations or points of interest. Plans are currently being developed by Oregon Department of Transportation (ODOT) to upgrade much of Highway 101 along the entire length of the coast. This would likely increase the volume of tourist traffic along the route and thus the amount of visitation to the NRA.

Effects of Recreation on Other Resources

Plant Communities and Wildlife Habitat

- Increased recreation development in corridors, development of additional corridors, and increased recreation use in undeveloped areas would eliminate or adversely impact the habitat for some plant and wildlife species or populations.
- Alternatives that encourage ORVs (Alternatives A, C, F(PA), and G) would sustain open sand in wheeltracks where there is repeated cross-country ORV traffic. Alternatives with a moderate amount of ORV traffic (Alternatives B and D) would produce a smaller amount of open sand in those areas where ORVs are allowed. Alternatives E and H would result in revegetation of vehicle tracks everywhere.
- Recreational gathering of forest products, such as mushrooms, berries or firewood could adversely affect some plant and wildlife species or populations.
- Recreational use may cause increased predation on and harassment of wildlife by domestic pets.
- Recreational use may cause wildfire, erosion, water pollution, vegetation composition changes or other problems that would directly or indirectly reduce habitat suitability for some species.

Water

- High dispersed recreation levels in riparian and wetland areas without adequate waste disposal facilities would increase risk of contamination of water sources with human and/or domestic animal disease organisms.
- High amounts of dispersed ORV use in riparian and wetland areas would increase risk of contamination of water sources with petroleum products.
- High amounts of dispersed ORV use in riparian and wetland areas would increase risk of sedimentation of water sources.
- Recreation use and development in the area south of Tenmile Creek could adversely impact water quality in an aquifer that serves as a municipal watershed.

Soils and Geology

- Recreation use in wetland and riparian areas would increase the potential for soil compaction and subsequent erosion and/or habitat change in these areas.
- Dispersed recreational use off trails in vegetated areas could create routes that would channel water, increase soil erosion, and cause changes in plant and animal habitats through wetland drying.

Fish

- Increased recreation access and fishing pressure on smaller NRA lakes could increase harvest and contribute to reduced fish populations.
- Increased recreation access and fishing pressure on NRA streams could increase harvest and adversely affect already diminished runs of anadromous species, such as salmon and steelhead.
- Recreation development and use in riparian areas could increase sediment and otherwise reduce water quality in NRA lakes and streams and adversely affect resident fish populations.
- More fishing pressure from recreationists could reduce wild fish populations and increase demand for non-native or hatchery stocked species.

Social and Economic Setting

- More recreation opportunities could attract greater numbers of visitors which could overtax some elements of community infrastructure and services such as roads, sanitation services, and emergency services.

- More recreation opportunities would enhance the appeal of areas adjacent to the Oregon Dunes NRA and could increase jobs and income in tourist industries.

**Assump-
tions Used**

- Increases in tourism in western Oregon (Dean Runyon Assoc. 1989), increased traffic on Highway 101 (on-going ODOT traffic counts; P. Mather, pers. commun.), and active Forest Service marketing of recreation opportunities available will result in increasing recreation demand at the Oregon Dunes NRA.
- Growth of recreation use at the Oregon Dunes NRA will be held to levels consistent with facility, biological resource, and desired-experience capacity (except in Alternative C).
- An average 3% annual growth in tourism will continue in the State of Oregon for the next decade.
- Visitation to the Oregon Dunes NRA will also grow by approximately 3% annually to the point where the supply of settings and opportunities is fully used during the peak season (May through September).
- Current seasonal use patterns will continue and the supply of recreation settings and opportunities will remain less than fully used during the "off" season (October through April).
- Current recreation setting preferences and recreation activity growth projections presented in the State Comprehensive Outdoor Recreation Plan (SCORP 1989) and Recreation Needs Bulletin (1991) are accurate and will continue through the next decade.
- Changes in recreation settings, such as from ORV to non-motorized or vice versa, will not in the long term effect the amount of use those settings receive.
- There will be no radical changes from current regional and nationwide trends relating to outdoor recreation activities and leisure time in general for the next decade.

**Incomplete/
Unavailable
Information**

- Future demand for recreation opportunities at the Oregon Dunes NRA.
- The capacity and current use levels of the undeveloped portions of the NRA.
- The effect of changes in quality of recreation experiences on visitation.

ENVIRONMENTAL CONSEQUENCES ON WATERSHED (SOIL AND WATER)

Direct and Indirect Effects

The primary direct effects of implementing the alternatives are:

- continued decreases in areas of open, drifting sand and increases in areas of deflation plains and vegetated dunes;
- changes in soil structure (compaction) adjacent to and within developed recreation areas; and
- changes in water quality.

Reduction of Open, Drifting Sand

Long-term persistent invasion of European beachgrass has encouraged the formation of a continuous high foredune adjacent to the beach. This foredune has reduced the sand supply to the inland open drifting dune system. Wind scour of the areas between the foredune and the remaining drifting dunes has formed a low, water-dominated deflation plain vegetated with sedges, rushes, shrubs and trees. The remaining open, drifting dunes are slowing in their easterly movement as they approach the Coast Range foothills, and are becoming vegetated as trees and brush encroach on their flanks. This process is expected to continue for the next several decades until much of the open sand disappears. Except for the most active dunes, local areas where intense efforts are made to remove beachgrass, and where breaches in the foredune are made and maintained, much of the NRA could ultimately become a patchwork of grassy hummocks; wet, brushy deflation plains; small patches of open sand; and high dune ridges covered with brush and trees.

The current rate of vegetation encroachment on open sand is approximately 2% per year (J. Kertis, pers. commun.). If this rate continues, the open sand that exists today will be mostly vegetated and stabilized within 50 years.

The general process of sand scour and deflation plain formation could be reversed by destroying the foredune. Preliminary data from a study being conducted at Oregon State University by Dr. Charles Rosenfeld indicates that even if European beachgrass could be successfully eradicated, the majority of the foredune would have to be physically removed to revive the inland open sand system. Sand below the first few feet of the surface is resistant to wind and wave erosion because the foredune is reinforced by logs, a discontinuous iron pan, and dense beachgrass root systems.

Some minor, localized movement of sand would occur following vegetation control activities planned in Alternatives A, B, D and G. Where local attempts are made to remove beachgrass and where narrow breaches are cut in the foredune, some sand would move inland, although probably not more than several hundred yards beyond the foredune directly behind the breach. The breaches would have to be maintained on a regular basis to prevent beachgrass invasion and rebuilding of the foredune.

Alternatives F(PA) and H include major efforts to control European beachgrass. Alternative H proposes beachgrass eradication in the area that lies between the third beach parking lot on the Umpqua Spit to Tenmile Creek. This area would become part of a demonstration project to test various methods that might change the effects of beachgrass on native vegetation and open, drifting sand. Alternative F(PA) identifies a broader area where beachgrass control could occur following site specific analysis. Methods used in either of these alternatives may include very large breaches of the foredune, chemical applications or hand pulling grass.

Alternatives C and E do not provide for any actions that would result in changes in beachgrass or sand movement beyond the foredune. No manipulation or removal would probably lead to some increases in extent of the deflation plain; vegetation encroachment on to the dunes; and consequent loss of open sand.

None of the alternatives, except F(PA), include provisions that would remove the foredune over large portions of the NRA. Alternative F(PA) proposes beachgrass control along several foredune sections. The extent of the control areas will depend on site specific analysis, finding effective control methods and funding. However, in areas where there is little or no conflict with other resources and funding is available, beachgrass control could result in renewed sand movement. Continued vegetation encroachment will probably occur in areas where no beachgrass control takes place or is unsuccessful.

Changes in Soil Structure

In areas where ORV and administrative vehicles are concentrated, or where there are trails, unimproved roads, recreation sites or administrative travelways, various degrees of soil compaction and loss of soil structure would occur. The degree and longevity of compaction would depend upon soil texture and the degree of soil development. Areas of free drifting sand would not experience compaction regardless of the amount of traffic, while moderately to well-developed sandy loam soils in vegetated areas near streams and lakes can be compacted by vehicles to the point that growth of vegetation may be adversely affected. Most day-use and camping facilities are in areas where the more well developed, easily compacted soils are found.

Alternatives A, B, C, F(PA) and G would result in some compaction from concentrated use of facilities such as campgrounds, staging sites and interpretive sites. No measurable changes in soil structure over natural levels are expected in Alternatives D, E, or H.

Changes in Water Quality

Sediment/turbidity - Alternatives A, B, C, F(PA) and G would be most likely to cause short duration increases in management-associated sediment and turbidity from construction of new facilities such as campgrounds, staging sites and interpretive sites. No measurable changes in turbidity or sediment over natural levels are expected in Alternatives D, E, or H.

Since sand is the primary component of the soils in the inland dune sector, these sediment increases are expected to be small and only last a few hours. Sediment would have negligible short-term effects on either water quality or aquatic habitat.

Physical removal of aquatic vegetation in lakes may contribute sediment and organic residues to downstream areas.

Toxic Materials - Contamination of soils and water with petroleum products is expected in areas where motor vehicles including ORVs are concentrated. Areas where vehicle storage, staging and maintenance activities occur inevitably experience inadvertent spills, and even indiscriminate disposal of petroleum waste. Also, petroleum or herbicide may be spilled occur in streamside areas where there are recreation, wildlife or fish enhancement projects. These materials move rapidly through the sandy soils to surface and ground water. The actual amount of such contamination is highly variable and cannot be predicted. Some amount of contamination with petroleum products would be likely in all alternatives.

Mitigation measures such as standards and guidelines that limit motorized dispersed camping (Alternatives A, B, D, F(PA) and G) would reduce, but not eliminate the potential for this impact. Spills would be minimal in size, and very rare in Alternative E and H.

Disease Organisms - Although disease organisms are uncommon in Forest streams, there is some risk that intestinal diseases could spread through water when waste from humans or other animals enters streams. This risk would be highest in those alternatives that support fairly high to high recreation levels (Alternatives A, B, C, F(PA), G, H), and least in those alternatives that restrict or discourage access (Alternatives D, E).

Mineral Content - There is evidence of increasing mineral content in the water of the dunes aquifer which provides industrial and domestic water to the communities of Coos Bay and North Bend. The increased mineral content (mostly iron) is the result of decomposing vegetation increasing the acidity of water percolating into the aquifer. The more acidic water picks up iron as it moves through the fine-grained sand and carries it into the aquifer. Alternative F(PA) is the only alternative that proposes treating vegetation to reduce mineralization of the dunes aquifer.

Cumulative Effects

Streams which drain private and state land upstream from the NRA may have elevated temperatures and higher levels of sediment and toxic materials where logging activities disturb streamside vegetation, cause erosion, or introduce human waste or petroleum products. These effects would accumulate in the large lakes downstream, and in the outlet streams that flow through the NRA. Activities on the NRA create far less disturbance, and should not noticeably increase these cumulative changes in sediment and temperature.

Mitigation Measures

- Use permits and designated dispersed camping sites to control vehicle concentrations, particularly near streams and wetlands, to prevent petroleum spills and dumping. Provide education and enforcement to encourage compliance. This would greatly reduce the likelihood of contamination of surface water.
- Provide toilets at all recreation sites especially where large concentrations of people are likely (including undeveloped areas). Toilets would discourage the practice of using areas near camping and staging areas for human waste disposal, greatly reducing the likelihood of bacterial contamination of surface and ground waters.
- Minimize administrative and recreational activities near riparian habitats. Reducing the amount of vehicle and foot traffic would allow sufficient time for recovery and regeneration, and would provide a high likelihood of long-term stability of the ecosystem.

Indirect Effects on Other Resources

Recreation

- As the area becomes more vegetated it becomes less suitable for some types of recreation.

Plant Communities and Wildlife Habitat

- As the dunes change from open sand to deflation plains, wildlife habitat would increase.

- As deflation plains continue to advance and become larger, total area of wetlands would increase proportionally.

Fish Habitat

- Further decline in lake water levels from groundwater pumpint would result in more losses of fish habitat.

Scenery

- Predicted changes in dune systems resulting from spread of European beachgrass would dramatically affect scenery by changing the area from an open sand dune landscape to a vegetated complex of hummocks, low hills and steep ridges.

Assump- tions Used

- European beachgrass can be eradicated only through means applied consistently over many years to the entire beach/foredune complex within the NRA.
- The foredune is not likely to be removed in the foreseeable future by natural forces (ocean waves or wind) even if European beachgrass is eradicated.
- Foredune removal is impractical and too expensive to be considered for any significant portion of its extent in the NRA.
- Some motorists (ORV and other) are likely to spill or dump crankcase oil on the sand in camping and staging areas.
- Rates of spread of vegetation on to open sand will remain constant over time.
- Sand is available off-shore to replenish the beach and dunes.

Incomplete/ Unavailable Information

- Site-specific effects of wind erosion rates on movement and revegetation of existing dunes.
- Long-term rates of expansion of deflation plains and of advance of European beachgrass.
- Long-term potential supply of sand from the beach and offshore areas.

ENVIRONMENTAL CONSEQUENCES ON SCENERY

Direct Effects

All land disturbing activities have a direct effect on the visual resource. These effects can be either positive or negative depending on a variety of things like location, size, color and viewing location.

Recreation Mix

Alternatives with high levels of recreation development (Alternatives A, B and G) have the highest potential for decreasing scenic quality. Ground disturbing activities, like road and facilities construction have a high potential of not harmonizing with the natural character of the landscape. The development of dispersed camping opportunities also have the potential of degrading the landscape, but at a much smaller scale.

Plant, Fish and Wildlife Habitat Management

Alternatives that prescribe management activities for plant, fish and wildlife habitat would have little direct effect on the visual resource. Generally, these facilities would be naturally appearing and to the average dunes visitor would have very little impact.

Wetlands Management

Management activities in all alternatives would contribute to the natural appearing landscape.

Vegetation Management

Alternatives (A, B, C, D, F(PA), G and H) that remove non-native and other encroaching vegetation would increase the visual variety. The degree to which variety is increased is a direct result of ground, both foredune and inland area, that is treated.

Research Natural Areas

Research Natural Areas would add to the naturally appearing condition of the landscape because most resource-modifying management activities, as well as road and facility development would be precluded.

Wild and Scenic Rivers

Alternatives that designate rivers for this category would maintain rivers and riparian zones in a naturally appearing state.

Indirect Effects

Scenery protected within a viewshed would usually improve the quality of recreation experiences.

Alternatives where people are encouraged to gather, either along a shoreline, at a developed site, or other facility have an indirect effect on the visual resource. Vegetation can be trampled or unrooted, user-built trails tend to appear, and litter detracts from the naturalness of the scenery.

Projects that fall within a protected viewshed would have to be designed and located in such a way as to meet the VQO of that viewshed. This may affect the appropriateness of some project in these areas.

Cumulative Effects

Cumulative effects would be identical to direct effects with the exception of the Highway 101 viewshed. This viewshed is the only one where effects of what other land managers/owners do may affect the appearance of the viewshed. Where this occurs, the cumulative effects would be a more altered appearance than predicted.

Mitigation Measures

The best way to mitigate the adverse effects of management activities is to design them to harmonize with the natural landscape. The degree to which an activity harmonizes is based on whether its form, color, line and texture replicate those of the characteristic landscape.

Another option to improve or maintain visual quality is to physically locate or relocate activities so that they are seen by few visitors. This may include locating them away from important corridors, viewing locations and existing recreation facilities.

Two other short-term management alternatives are rehabilitation and enhancement.

Rehabilitation - this includes activities which return a landscape to a desired level of visual quality. Such rehabilitation projects might include:

- Vegetating areas to eliminate obtrusive edges, shapes, patterns, colors, etc.
- Altering the terrain to blend with natural-appearing slopes.
- Revegetating cut and fill slopes.
- Treating vegetation to restore natural geologic processes (e.g. sand movement) and native plant communities.
- Removing or concealing structures containing obtrusive form, color, line or texture.

Enhancement - a short-term management alternative aimed at increasing positive visual variety where little variety now exists. Examples of this might include:

- Manipulating vegetation to open up vistas or screen out undesirable views.
- Adding native plant materials to enhance color, form or texture to an area.

**Assump-
tions Used**

- It is physically possible to locate proposed activities so that they would meet the visual quality objectives.
- Breaching the foredune would create visual variety and landscapes affected by the breach would appear natural.
- If European beachgrass is not controlled or eradicated it would continue to spread and visual diversity would be lost.
- The more concentrated an area with facilities, the more difficult it is to retain a natural-appearing landscape.

**Incomplete/
Unavailable
Information**

- The exact acres and location of the seen area of each viewshed.
- The existing condition and visual quality of all seen areas.
- Impacts of proposed projects. Impacts cannot be fully determined until plans are more fully developed for each alternative.

ENVIRONMENTAL CONSEQUENCES ON PLANT COMMUNITIES AND WILDLIFE HABITATS

Direct and Indirect Effects

Actions described for alternatives can affect the amount and quality of wildlife and plant habitats, the diversity and spatial arrangement of these habitats, and the species composition and richness within a particular habitat. The amount of habitat provided would vary between alternatives depending on how much is created, maintained or removed in that alternative. Alternatives can also affect the quality of a particular habitat by affecting physical characteristics of the habitat (soil, water, etc.) or by changing biological features. Biological changes which affect the quality of a habitat include natural or human-induced plant succession, habitat fragmentation, changes in species composition and diversity of plant communities, and loss and/or change in habitat components (dead and down wood, well-developed shrub layer, snags, decomposers). Conversely, alternatives may include management activities which enhance existing habitats by providing vegetation structure or other important habitat components.

The quality of a plant or wildlife habitat also depends on the extent and degree of human use of the area (both recreation and administrative). Both motorized or nonmotorized use may impact plant species either directly by physical trampling or removal of individual plants or indirectly by changing water regimes, introducing toxins, introducing fire, etc. Trampling may increase the rate of spread of non-native plant species which are more adapted to colonizing disturbed sites. Excessive human use may result in soil erosion and water channelization, effectively changing the numbers and kinds of plant species supported by a particular habitat.

Additionally, numerous studies indicate that increased human use of an area disturbs many wildlife species (Sampson 1983). Nests, eggs or young may be crushed by foot travelers, equestrians, vehicles or dogs. Human disturbance can alter normal behavior patterns of birds and mammals resulting in disrupted nest attentiveness; abandonment of nests, young, or breeding territories; reduced productivity; or changes in foraging behavior (Pomerantz et al. 1988, Knight and Skagen 1987). Many birds and mammals flee or flush when disturbed, resulting in increased stress levels (which may increase incidence of disease), increased use of important energy stores, and increased risk of predation on nests or young. If the disturbance is frequent and prolonged, individuals may permanently abandon a habitat. Human disturbance of preferred habitats may cause individuals to shift to less than optimal habitats (Erwin 1980).

Moreover, human disturbance almost always decreases wildlife species diversity. Some species are quite tolerant of human disturbance and may habituate even to frequent interactions with humans or vehicles. However, many intolerant species may permanently abandon a disturbed area; species including the great-blue heron, the bald eagle, and numerous shorebirds intolerant of human disturbance may

leave otherwise suitable habitats. Therefore, habitats which receive heavy recreation or administrative use may support large populations of tolerant wildlife species which replace intolerant species (Josselyn et al. 1989). Many tolerant scavenger species including bears, racoons, opossums, skunks, crows and jays are actually highly associated with areas of high recreation concentration such as campgrounds or picnic areas. Concentrations of these species in recreation areas often results in recreation conflicts and may impact wildlife populations by changing natural feeding patterns and by increasing the rate of wildlife disease spread.

Human use is more likely to result in wildlife disturbance in open habitats with little escape cover; disturbance is also more significant during the breeding season when flight may result in egg cooling, increased predation on nests or young, or permanent abandonment of nests or young. Heavy human use in an area may also affect plant and animal habitats through contamination from human waste disposal, toxins, petroleum spills, garbage dumping or by introducing fire.

Much discussion has taken place regarding the amount of disturbance resulting from motorized traffic versus non-motorized traffic. Foot, equestrian, bicycle and motorized vehicle traffic can disturb plant and wildlife habitats. However, in general, the impacts of motorized traffic are greater than those produced by non-motorized traffic largely because: 1) the physical impact of a heavy, power-driven machine is greater, 2) the range or area covered by a motor vehicle in a given amount of time is larger, and 3) the area disturbed by sight and/or sound is typically greater for motorized traffic (Fowler 1978). Thus habitats open to ORVs and those open to restricted riding sustain greater effects than similar habitats open only to non-motorized traffic. For the most part, areas open for unrestricted riding (Management Area B) were selected because they are relatively unvegetated and support few wildlife species; however, the alternatives allocate restricted riding areas in several vegetated habitat types (Figure IV-3). These habitats would receive greater impacts and would be impacted for longer periods of time than similar habitats not available for ORV riding.

Figure IV-3. Acres of ORV restricted riding area for wetland and forested habitat types.

Habitat Types	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Deflation Plain	4,330	650	3,640	1,560	N/A	3,945	3,630	N/A
Upland Forest	2,540	10	1,440	60	N/A	510	1,340	N/A

Habitats in closed or ORV restricted areas may be disturbed by vehicles operating in adjacent areas open to ORVs or by violations of vehicle closures. Vehicle violations (ranging from occasional to frequent) do occur in various habitat types, as evidenced

by vehicle tracks, although the exact number of violations is not known. Alternatives which open large areas to ORVs or those with more complex patchworks of open/closed areas increase the potential for disturbance of, or vehicle violations into, closed areas (Figure IV-4).

Figure IV-4. Miles of interface between areas open to ORVs and vegetated areas closed to ORVs.

Habitat Types	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Deflation Plain	38.5	2.5	30.4	5.6	N/A	28.8	38.2	N/A
Hummock	25.0	17.4	21.5	6.7	N/A	14.8	23.4	N/A
Upland Forest ¹	9.6	1.6	8.3	4.7	N/A	7.0	8.7	N/A
Other Vegetated Areas	5.6	2.3	5.7	0.9	N/A	3.4	6.0	N/A
Total	50.2	30.7	48.4	16.3	N/A	34.3	47.2	N/A

¹ Tree island perimeters not included in these figures.

Effects on Specific Habitat Types

Upland Forest Habitats - Forested areas within the NRA, including both shore pine and transition forests, provide habitat for many plant species and for a wider array of wildlife species than any other habitat. Species dependent on upland forests have widely differing requirements; therefore, changes in forest habitat may affect one species quite differently than another. Two major categories of species may be described: forest interior species which require large, undisturbed tracts of forest habitat, and forest edge species which benefit from roads and clearings. Important biological components of forested areas include snags, dead and down wood, layering or vertical structure, trees of diverse age classes, large diameter trees, clearings to increase horizontal diversity, and an undisturbed litter layer. The presence and abundance of these components will vary between alternatives as a result of construction activities, recreation activities and habitat management activities.

Forested habitat would be physically altered (trees or other important habitat components removed) by construction activities associated with building new roads, trails, designated travel routes and facilities. Alternatives which include high levels of road, trail and facility construction (Alternatives A, B, G) would remove more habitat than those which include the addition of only a few miles of roads and trails and few new facilities (Alternatives D, F(PA), H; Figure IV-5). Alternative E would actually allow some forested habitat to regenerate on abandoned trails, roads and facilities.

The construction of roads, trails and designated travel routes can also affect the suitability of forested habitat by increasing forest fragmentation. Fragmented forest habitat would be less suitable for forest interior species which require large, undisturbed tracts of woodland. Although the construction of both hiking and ORV trails or designated routes in these alternatives would slightly enhance habitat for those species benefiting from travel corridors and increased edge habitat, forest edge is not limited on the NRA, while undisturbed forest interior may be. Those alternatives which include many miles of roads, trails and designated travel routes (Alternatives A, B, G) would result in highly fragmented forested areas. Alternatives C, F(PA) and H would be slightly fragmented and the remaining alternatives would exhibit very little or no forest fragmentation.

In addition to the effects of facility and trail construction, recreationists themselves may physically disturb plant and wildlife habitats by removing or altering important forest habitat components or by directly disturbing wildlife. These effects would be limited primarily to areas within a short distance of facilities, roads and trails; however, recreationists leaving trails and/or designated travel routes would impact greater areas of forested habitat. Both developed and dispersed campers decrease the presence of dead and down woody material (important to insect eaters, scavenger species and amphibian populations) in forested areas. Dispersed camping also disturbs underbrush and herbaceous material and increases the risk of fire damage in forest habitats. Mushroom gatherers may decrease populations of fungi in localized areas, decreasing the amount of mushrooms available to small mammals and deer which rely on these for food. These effects would be most pronounced in alternatives which provide substantial access to forested habitat interiors (Alternatives A, B, C, F(PA), G), those with many miles of interface between ORV riding and forested habitats (Alternatives A, C, F(PA), G), and those which are expected to substantially increase developed and dispersed camping (Alternatives A, B, G). Alternatives A and G would result in the most disturbance, Alternatives B, C and F(PA) would exhibit moderate levels of disturbance. Restrictions on motorized dispersed camping in Alternatives A, B, F(PA) and G would mitigate, but not eliminate these effects. The remaining alternatives (Alternatives D, E, H) would exhibit few or none of these effects.

Alternative F(PA) would provide the highest level of protection to globally significant plant communities that occur in upland forest habitats (shore pine/hairy manzanita-bearberry and Port Orford cedar/evergreen huckleberry). This alternative allocates globally significant plant communities to MA10(F), which provides for active monitoring and management of these communities to protect and maintain them. Alternatives B, D, E, and H provide protection to forested globally significant plant communities from motorized vehicle recreation, but do not provide the active monitoring and management provided by Alternative F(PA). Alternatives A, C and G have at least some of these communities in areas designated for off-road vehicles on designated routes, and, therefore, a greater potential for disturbance from off-road vehicle recreationists leaving designated routes.

In addition to the effects of general recreation, ORV recreationists can affect forested habitats by leaving designated routes, by violating closures and physically impacting vegetation, by eroding sand on forest edge or tree island banks, by disturbing forest edge species, and by precluding undisturbed wildlife travel between tree islands and other habitats. ORV activity in or adjacent to tree islands or adjacent to other forested habitats can either compact or erode soil, which in turn damages tree roots and soil microorganisms that are beneficial to plants, such as mycorrhizal fungi. This would impact the health and vigor of plants. Benefits of mycorrhizal fungi to plants include enhanced uptake of nutrients and water, protection against pathogens, improved resistance to drought, enlarged root systems, and tolerance of heavy metals (Molina and Amaranthus 1991). Tree island habitats and forest edges would be impacted under alternatives which support high levels of ORV use (and therefore expose more tree islands to these effects) (Alternatives A, G) and/or those which have many miles of interface between unrestricted riding areas and forested habitats (Alternatives A, C, F(PA), G) (Figure IV-4). These effects would be less under Alternatives B and D which include fewer ORV riding areas and would be nonexistent under Alternatives E and H which include no riding area.

Habitat management activities would also have a great affect on the quality of forested habitats. Management actions would be designed to enhance vegetative diversity within a given stand as well as to increase the diversity of forest habitat types across the NRA. Alternatives D, F(PA) and H would provide the most suitable forested habitat because some forested areas would be managed to optimize wildlife and plant needs. Alternatives A, B, C, E and G do not include extensive management of forested habitats. Under these alternatives, forested areas would provide moderately-diverse habitat for wildlife and plants, although diversity would likely decrease over time as transition forest clearcuts convert to second growth stands.

In summary, Alternatives D, F(PA) and H would provide the most diverse, least fragmented, least disturbed forested areas. Forested areas would be undisturbed and unfragmented in Alternative E, but would not exhibit vegetative diversity while forested areas under Alternatives A, B, C and G would be more fragmented and disturbed and less diverse than forested areas in other alternatives.

Figure IV-5. Condition of various components of upland forest habitat.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of forest removed by construction	Mod.	Mod.	Low	Low	None	Low	Mod.	Low
Degree of forest fragmentation	High	High	Mod.	Low	V. Low	Mod.	High	Mod.
Loss of important habitat components (snags, dead and down wood, mushrooms, litter layer, etc.)	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Low
Level of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Amount of disturbance to forest edges	High	Mod.	Mod.	Low	None	Mod.	High	None
Degree of forest diversity	Low	Low	Low	High	Low	High	Low	High
Overall Habitat Condition	Poor	Fair	Fair	Excell.	Good	Good	Poor	Excell.

Riparian Habitat - Riparian habitats would be most affected by long-term changes in water levels, types and levels of recreation use, and long-term changes in plant succession. Although water levels have been declining in some places on the NRA, water levels are not expected to change between alternatives. Therefore, the alternatives would affect riparian habitat primarily through recreation construction, recreation activities, and habitat management.

Recreation opportunities are often focused in riparian habitats because water is an attractive component of recreation experiences for many people. Trails and roads are often designed to follow creek or river courses or lead to lakes, ponds or other water bodies and recreation facilities are often placed near water sources as well. Construction activities - and the resulting trails, roads or facilities - would physically alter riparian habitat and could increase bank erosion and water contamination. Because riparian areas are typically quite narrow (less than 100 feet wide), construction within the riparian strip may effectively reduce the quality of riparian habitat in the area. Alternatives which include many roads, trails and facilities along rivers and lakes (Alternatives A, B, C, G) would impact riparian habitat the most (Figure IV-6). Alternatives D, F(PA) and H include several new angling facilities on lake edges which would impact a small localized area of riparian habitat. Alternatives D and F(PA) would reduce impacts to some riparian habitats by removing or rerouting trails out of riparian habitat and by removing or otherwise mitigating the effects of campsites adjacent to water bodies. Alternative E minimizes impacts to riparian areas by eliminating many trails and campgrounds adjacent to water. Riparian habitat would be further protected in Alternatives D, E, F(PA)

and H which would nominate NRA streams for Wild and Scenic River status which would preclude most construction activities).

Both water-based (fishing, boating, fish-viewing) and non-water based (hiking, dispersed camping) recreationists may also affect riparian habitats by physically removing or altering important habitat components or by increasing human disturbance within the riparian corridor (Brown 1985). Recreation use in adjacent aquatic habitats may also affect the quality of riparian habitat by affecting bank stability. Alternatives which include high recreation levels (Alternatives A, B, G), high ORV recreation levels (which allows access to more remote riparian habitats) (Alternatives A, G), and those which substantially increase angler access to lakes and streams (Alternatives D, F(PA), H) would impact riparian habitats by increasing vegetation disturbance and human disturbance of wildlife, and potentially decreasing wildlife and plant diversity. However, facilities constructed under these latter alternatives would be designed to focus angler use in small areas, thereby reducing overall riparian impacts.

In general, most negative effects on riparian habitat associated with both construction and recreation disturbance can be minimized or eliminated at the project planning level through various means including: routing trails away from riparian habitats, screening trails and designated campsites away from water bodies, designing new trails or regrading existing trails to reduce erosion, prohibiting or limiting dispersed camping and ORV riding near water bodies (Alternatives A, B, D, F(PA) and G), providing information on low-impact camping to visitors, and restricting motorized boat use in aquatic habitats.

Habitat management activities in Alternatives D, F(PA) and H would enhance existing riparian habitats. Under these alternatives, management activities could be directed at providing important riparian components which currently are limited or nonexistent. The remaining alternatives do not include riparian habitat management objectives.

In summary, Alternative D would provide the most diverse, least disturbed riparian habitat. Riparian habitat in Alternatives A, B, and G would be highly disturbed and no habitat management would be planned; riparian areas would be least suitable in these alternatives. Alternative E would provide unmanaged, but undisturbed riparian areas while Alternatives F(PA) and H would provide somewhat disturbed, but managed riparian areas; all 3 of these alternatives would provide a relatively high amount of suitable riparian habitat for wildlife and native plant species.

Figure IV-6. Condition of various components of riparian habitat.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of riparian habitat removed by construction	High	High	Mod.	Low	None	Low	High	Mod.
Level of localized human disturbance (from fishing facilities)	Mod.	Mod.	Low	High	Low	High	High	High
Level of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Amount of riparian habitat managed	Low	Low	Low	High	None	High	Low	High
Overall Habitat Condition	Poor	Poor	Fair	Excell.	Good	Good	Poor	Good

Meadows - Meadow habitats within the NRA would be most affected by ground-disturbing activities within the meadow, recreation use and habitat management activities. All alternatives except for C and E include some level of construction in or near meadow habitat; more meadow habitat would be removed in Alternatives A, B and G than in Alternatives D, F(PA) and H.

Increased human use would also affect the quality of meadow habitat because meadow vegetation is particularly susceptible to trampling and disturbance. Excessive physical disturbance may allow non-native weed species to outcompete and replace native vegetation. Alternatives A, B, and G would substantially increase recreation use in both Butterfield and Lodgepole meadows. Alternatives C, D, E, F(PA) and H provide for no or low-level human use in meadow habitat; therefore, human disturbance to the meadows would be low under these alternatives.

The level of habitat management in meadows would also largely determine meadow quality. Habitat management objectives for meadow habitat would include managing for native plant species and maintaining meadow habitat over time. Alternatives D, F(PA) and H include actions designed to enhance meadow habitat and would therefore provide the most suitable habitat for wildlife and meadow plant species over time. Alternatives which do not include active meadow management (Alternatives A, B, C, E, G), meadow habitat would gradually be replaced by low shrub habitat and eventually transition and/or shore pine forest.

In summary, Alternatives D, F(PA) and H would provide the least disturbed meadow habitat over time that would be the most suitable for wildlife and meadow plant species. Alternatives C and E would provide relatively undisturbed meadow habitat in the short term, but this habitat would eventually convert to upland forest. The remaining alternatives would provide somewhat disturbed meadow habitat within

the planning period; meadow habitat under these alternatives would convert to upland forest.

Beach Strand - The alternatives can affect the amount and quality of beach habitat through recreation activities which compact sand, physically disturb plant and wildlife habitat, or directly disturb wildlife. Though protective measures would be taken to protect sensitive plant populations and communities, such as the globally significant American dunegrass community, the amount and quality of potential habitat available for these plant species and communities to colonize would be affected by beach strand activities. Plant species of beach strand habitats, such as yellow sandverbena, which is not currently on the Forest's Sensitive Plant List but appears to be declining on the NRA, would also be affected by activities in these habitats. Sand compaction can destroy subsurface invertebrates which are important food sources for many shorebirds (Boyd and DeMartini 1977). ORVs would compact sand more severely than foot traffic and can cover greater distances along the beach than can foot travelers in the same time period. Therefore, alternatives which open large areas of beach to ORVs (Alternatives A, C, G) would result in the most sand compaction (Figures IV-7 and IV-8). Alternative F(PA) would result in a moderate amount of sand compaction. The remaining alternatives would result in very little or no sand compaction.

Recreationists may also reduce the suitability of beach habitats by trampling native beach plants, shorebirds or their nests or by increasing human disturbance of foraging or resting wildlife. The NRA beaches support some of the highest populations of wintering sanderlings along the Pacific coast; these small shorebirds are particularly susceptible to human disturbance and may switch their foraging period to dusk and night when disturbed (Burger and Gochfeld 1991). A comparative study on the eastern U.S. coast found that shorebird populations were twice as numerous and bird species richness was higher on beaches closed to ORVs as compared to those open to vehicles (Florschutz and Williamson 1978). Some nesting bird species are also disturbed by foot traffic (Godfrey et al. 1975). Marine mammals including the harbor seal, elephant seal and sea lion use the beach for loafing and basking during the spring molt; these species are quite intolerant of human disturbance.

The degree of trampling would depend on the type of recreation, the number of recreationists expected, the number of access points provided, and the amount of beach open to vehicle traffic. In all alternatives, human disturbance of some wildlife and native plant species would be quite high on beaches adjacent to parking lots or other foot travel access points; disturbance would decrease with increased distance from an access point. Disturbance would be lowest in stretches of beach closed to ORVs and far from foot access points. All alternatives, except E include many access points along the beach; thus the number of visitors expected and the amount of beach open to vehicle traffic will better predict the amount of suitable beach habitat. Alternatives A and G are expected to increase the number of recreationists and the amount of beach open to motorized traffic; these alternatives would provide very little suitable beach strand habitat. Alternative C also provides little suitable beach habitat because it supports moderate recreation use levels and opens large

areas of beach to ORVs. Alternatives B, F(PA) and H increase recreational use of beaches, but close some or all beaches to ORVs. These alternatives would support a range of suitable beach habitat. The remaining alternatives (Alternative D and E) would reduce use of beaches and would close most beaches to ORVs; these alternatives would provide the most suitable beach strand habitat for wildlife and native plant species.

Figure IV-7. Approximate miles of undisturbed beach.

Habitat Types	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Miles of beach closed to vehicles	10.6	35.8	6.8 ¹	30.9	39.2	16.5 ²	7.8 ¹	39.2
No. of beach access points	14	12	12	11	3	12	12	11
Miles of remote beach ³	6.0	26.5	2.8 ⁴	23.2	34.6	9.0	0.0 ⁵	18.9

¹ 8.9 additional miles are seasonally closed to ORVs

² 5.0 additional miles are seasonally closed to ORVs.

³ Remote beach includes beaches closed to vehicle traffic and greater than 1 mile from vehicle access

⁴ 4.1 additional miles are seasonally "remote" due to season vehicle closures

⁵ 4.4 additional miles are seasonally "remote" due to seasonal vehicle closures

A second important factor affecting the amount of beach habitat available is the presence of European beachgrass. Significant amounts of beach, including sand spit areas critical to the nesting snowy plover, have been lost due to the creation of the foredune. Removal and control of European beachgrass on the foredune would expand beach habitat eastward widening the beach strand. Creating new beach strand habitat would facilitate colonization of the area by native beach plant communities unless the area is used by ORVs. More open sand would also be available for those species which forage and/or nest above the mean high tide line.

Alternatives C and E do not provide for beachgrass control so no new beach habitat would be created under these alternatives. Beachgrass control in the remaining alternatives would create additional beach habitat. Those alternatives which include beachgrass control in areas with limited human access (Alternative D and H) would provide more suitable wildlife and native plant habitat than those in which beachgrass control is aimed at enhancing recreation (Alternative A, B, G). Alternative F(PA) proposes beachgrass control in a mixture of settings. RNA management could include beachgrass control; therefore alternatives which designate one or more RNAs (Alternatives B, D, E, F(PA), H) may increase beach acreage. These segments of beach would receive little human use and would therefore provide relatively undisturbed beach habitat.

In summary, those beaches which receive the greatest human disturbance (Alternatives A, C, G) are the least suitable for plant and wildlife habitats. Alternatives B,

F(PA) and H provide some undisturbed suitable habitat, while Alternatives D and E which include many miles of undisturbed beach would provide the most suitable beach strand habitat.

Figure IV-8. Condition of various components of beach strand habitat.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of sand compaction	Mod.	Low	Mod.	Low	V. Low	Mod.	Mod.	V. Low
Miles of disturbed beach	High	Low	High	Low	Low	Mod.	High	Mod.
Level of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Amount of new undisturbed beach created ¹	None	Low	None	Mod.	Mod.	Mod.	None	Mod.
Overall Habitat Condition	Poor	Fair	Fair	Excell.	Excell.	Good	Poor	Good

¹Includes beach created through non-native beachgrass control in, and outside of, RNAs

Wetlands - Wetland habitats would be most affected by construction activities, types and levels of recreation, and habitat management activities. Constructing roads, trails, designated ORV routes and facilities in wetland habitat would slightly reduce the wetland landbase (by removing actual road and/or trail portions from the habitat base) and by potentially channelizing and thereby draining wetlands. ORV trails and designated routes are more likely to channelize wetlands than are foot or equestrian trails because tires scour and throw sand more than foot traffic (Fowler 1978). Draining, or even partially draining, wetlands may alter the water regime enough to result in plant community changes. Channelized wetlands may not hold water long enough into the breeding season to be suitable for waterfowl breeding habitat. Dissecting wetlands with roads and trails would also increase habitat fragmentation making the areas less suitable for interior wildlife species and potentially affecting long-term viability of native plant populations. Ground-disturbing activities within a wetland may also increase the risk of spreading non-native plant species. These effects would be fairly high in Alternatives A, B, C, F(PA) and G which include many miles of roads, trails, designated routes and/or facilities (Figure IV-9). Of these, Alternatives A, C, F(PA) and G would potentially affect more wetland areas because more wetland area is allocated for ORV restricted riding. Regular maintenance of designated ORV routes in Alternatives A, F(PA) and G would reduce, but not eliminate vehicle impacts in wetlands. The construction of wetland-related wildlife viewing areas in all alternatives except E would cause some localized physical disturbance of wetland vegetation. However, viewing areas would be constructed outside of critical wetland habitats and would be designed to reduce physical impacts to wetlands vegetation.

High levels of recreation use would also affect wetland habitats because wetland soils are compacted easily and wetland vegetation is particularly sensitive to trampling. Human disturbance may also affect species using wetland habitats. In one California study, recreation use in wetlands resulted in decreased use of the area by particularly sensitive species; sensitive birds flushed at distances of 75-175 feet from human disturbance (Josselyn et al. 1989). Alternatives which support high recreation levels (Alternatives A, B, G), particularly those with high levels of off-road restricted riding (Alternatives A, G) would result in some vegetation trampling and human disturbance of wetland-related wildlife. These alternatives also have the greatest potential to impact wetland endemic plant species and globally significant plant communities (shore pine/slough sedge and bog blueberry/tufted hairgrass). Though populations of plants on the Forest's Sensitive Plant List are protected, these alternatives have the greatest potential to reduce the amount and quality of potential habitat available for sensitive plants to colonize and expand their range. The Forest's Sensitive Species which occur in wetland habitats are Oregon anemone, large-awn sedge, several-flowered sedge, water pennywort, Frye's moss, bog clubmoss, common adder's tongue, North Pacific plaintain, Pohlia moss, and wool-grass. ORV activities in non-vegetated habitats can also affect adjacent wetlands by: increasing the risk of violations in wetlands, changing water flow patterns into wetlands, and reducing or precluding the growth of wetlands vegetation in the eastwardly expanding deflation plain. Alternatives with many miles of interface between open riding areas and wetlands (Alternatives A, B, C, F(PA), G) will exhibit these effects more than the remaining alternatives.

These effects could be partially mitigated by designating relatively few ORV routes or trails through wetland habitat, by creating a buffer around wetland habitat, by screening trails and designated routes, by prohibiting concentrated dispersed camping in wetlands areas, by designing boardwalks and/or raised surfaces for foot and vehicle traffic through wetlands, and by providing educational signing and/or other information about the value of wetlands.

The Oregon Dunes NRA has issued a special use permit that allows for extraction of groundwater under an existing water right. The permit establishes terms that must be met in accordance with Congressional records indicating an expectation that surface waters be protected from excess drawdown and other federal regulations protecting wetland loss. Currently, there is controversy over the effects groundwater pumping is having on surface water and wetland vegetation. The permittee has contracted a study to assess this situation. Study results will provide a basis for assessing current and proposed future increased pumping effects. The permit expires in 1999 and is included in all alternatives.

The level of wetlands management in each alternative would also have a great affect on the amount, quality and diversity of wetland habitat. Although deflation plain wetlands continue to expand eastward as wind scours the eastern deflation plain edge down to the water table, rapid succession quickly converts early seral stage wetlands (grass, sedge, rush, low shrub) into later seral stages (tall shrub, shore pine). Thus, over time, the deflation plain wetlands would convert to habitat

types which resemble upland types in terms of vegetation structure and the types of plant and wildlife species they support. All of the alternatives, except Alternative E, contain some level of wetlands management. Alternatives D, F(PA) and H which include moderate to high levels of wetlands management would maintain more wetland habitats, and more diverse wetland habitats than the remaining alternatives (Alternative A, B, C, E, G). Managed wetlands in Alternatives A, B, C, F(PA) and G are in areas adjacent to ORV riding areas or are near roads and/or trails; thus few remote, undisturbed early seral stage wetlands would exist. Alternatives D and H would manage a range of easily-accessible to remote wetlands and would thus maintain undisturbed, early seral stage wetlands. Under Alternative E, no wetlands management would take place so later seral stage wetlands would predominate.

Because all deflation plain wetlands are a direct result of the foredune establishment, successful attempts to control beachgrass along the foredune would result in some loss of wetlands due to inland sand movement. This loss of wetlands is expected to be minimal as the amount of foredune removed and the subsequent influx of sand would be minimal during this planning period, and because treatment areas may be selected adjacent to narrow deflation plains or those in later successional stages.

Alternatives which include more beachgrass control (Alternatives A, F(PA), G, H) could result in the most (but still minor) wetlands loss. Alternative F(PA) now incorporates a much more aggressive beachgrass control effort due to public input during DEIS review. Locations are general and will require in-depth analysis through development of a strategy and further environmental analysis including potential impacts to wetlands.

Predictions as to the extent of beachgrass management and sand movement are difficult. Currently, management techniques have not been refined into a cost-effective method. Further research and experimentation will be needed before large acreages of beachgrass will be eradicated. In addition, sand movement may be curtailed or reduced by deflation plain vegetation or not enough beach sand available for recruitment. Therefore, at present predictions cannot be made as to the capability of the Forest Service achieving an aggressive beachgrass management goal or as to the extent this management will have on a loss of deflation plain wetlands.

Based on current knowledge available concerning beachgrass management success and lack of sand movement; the ability to control adverse wetland effects in planning beachgrass management locations and further review through site specific analysis, implementation of Alternative F(PA) could result in a slight loss of deflation plain wetlands. This potential loss would represent a small percent of deflation plain wetlands on the Oregon Dunes NRA.

Alternatives which nominate one or more RNAs for study (Alternatives B, C, D, E, F(PA), H) may result in some protection of wetlands habitat due to beachgrass control. For example, the proposed Tenmile RNA contains inland deflation plain

habitats that are dominated by native plant species. Removing beachgrass adjacent to these areas may help maintain these wetlands as native plant communities. Also, human disturbance of wetland vegetation and wildlife could be reduced in RNAs.

In the event that the beachgrass management goal in Alternative F(PA) is met there could be a return in some areas to more natural processes where some wetlands would be kept in early seral stages from continual loss through sand inundation and creation through scouring. This change would be offset to some extent by the fact that wetlands have been gradually increasing on the NRA and that there will be active management in areas to maintain and enhance wetlands.

In summary, Alternative D would provide the most diverse, least disturbed wetland habitats. Alternative E would provide undisturbed wetlands, but would not manage these wetlands to maintain diversity. Conversely, Alternatives F(PA) and H would manage many wetland acres, although disturbance would be moderate in these alternatives. High disturbance levels in Alternatives A, B, C and G would reduce the suitability of many wetlands and little management would take place in these alternatives to maintain diversity.

Figure IV-9. Condition of various components of wetlands habitat.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of wetland fragmentation	High	High	Mod.	Low	V. Low	Mod.	High	Mod.
Amount of wetland channelization	High	High	Mod.	Low	Low	Mod.	High	Mod.
Level of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Degree of wetland diversity	Low	Low	Low	High	V. Low	High	Low	High
Amount of wetlands lost to sand encroachment	Low	Low	None	Low	Low	Mod.	Low	Low
Overall Habitat Condition	Poor	Poor	Fair	Excell.	Good	Good	Poor	Good

Sand Dunes - While sand dunes are not particularly hospitable to either vegetation or wildlife, they do support unique plant communities and are used by a variety of wildlife species. Few construction activities are planned for open sand areas; thus native sand dune vegetation would be most affected by recreation activities and control of non-native vegetation. Wildlife species using sand dune habitats are most likely to be affected by loss of cover due to recreation-related vegetation trampling or beachgrass control.

High recreation levels, particularly ORV recreation levels, would reduce native plant species and their habitat in 2 ways. First, native sand dune species are particularly susceptible to trampling. Not only are the plants themselves impacted, but soil conditions are altered. Liddle and Greig-Smith (1975) report that off-road vehicles in a dune ecosystem cause a 30 percent greater increase in soil bulk density and a 100 percent increase in soil penetration resistance than trampling by non-motorized types of recreation, frequently breaking the organic soil crust. Second, excessively disturbed areas are often colonized by weedy, aggressive, non-native plant species which outcompete native plant species. High recreation use may contribute to the spread of European beachgrass by transporting pieces of rhizomes on tires, clothing, etc. (A. Buell, unpublished data). Uncleaned ORV tires may accidentally transport seeds of exotic plant species into an area. Vogt (1979) cites several studies demonstrating that ORV recreation impacts vegetation. Native plant species whose numbers are reduced by ORV activity include large-headed sedge, American dunegrass, seaside daisy, coast eriogonum, American glehnia, seashore bluegrass, and seashore bluegrass (Wiedemann 1984). Globally significant plant communities that occur in sand dunes are red fescue, American dunegrass, and seashore bluegrass.

Alternatives which support high (Alternatives A, G) or moderately high (Alternatives C, F(PA)) levels of ORV recreation would decrease overall sand dune plant species richness and diversity the most (Figure IV-10). Alternatives with little area open to ORV's (Alternatives B, D) would be only slightly affected. Alternatives E and H would have none of the above effects on vegetation.

American dunegrass and seashore bluegrass globally significant plant communities may no longer exist on the NRA. Therefore, the effects of the alternatives on these two globally significant plant communities can only be evaluated in terms of how the alternatives affect potential habitat for these communities. The greatest threats to sand dune plant communities and potential habitat is from off-road vehicles and encroachment from invasive vegetation, specifically European beachgrass. Alternatives A, C, G and F(PA) (as discussed in the above paragraph), which decrease overall sand dune plant species richness and diversity, will be reducing the opportunities for these two plant communities to develop. Alternatives B, D, E and H would possibly allow recovery of areas to the point where the American dunegrass and seashore bluegrass communities develop.

In Alternatives D and F(PA), all known globally significant red fescue plant communities (5 total) are in MA10(F). Alternative F(PA) provides for active monitoring and management of these communities to protect and maintain them, while Alternative D provides equal emphasis to fish and wildlife habitat. The long-term protection for red fescue globally significant plant communities is greater in Alternative F(PA) because these areas will be specifically managed. In Alternative D, they will be protected from disturbances, such as motorized recreation, yet other fish and wildlife resource objectives may take precedence. Non-native vegetation management can also affect sand dune plant communities and wildlife habitats. The spread of European beachgrass has resulted in a decline

in the numbers of native sand dune plants and the amount of habitat available for them. Depending on the amount of control or eradication included in each alternative, native plant species habitat may be enhanced, allowing native species such as American dunegrass, yellow sandverbena, and beach morning glory to increase. In addition, vegetation management proposed in Alternative F(PA) may include seeding or planting native species after beachgrass treatment which would provide further enhancement for native species.

Non-native vegetation management levels would be greatest in Alternatives A, F(PA), G and H. The objectives of management in Alternatives A and G, however, is to increase the amount of open sand for ORVs. Alternative F(PA) proposes vegetation management in a variety of areas for a variety of objectives including recreation. Because native plant species are susceptible to ORV activity, these alternatives would not enhance habitat for native plant communities. Non-native vegetation management in Alternatives B, D, F(PA) and H, in areas where the objectives are to enhance non-motorized recreation or to enhance native species habitat, would increase the existing cover of native plant species. These alternatives also recommend one or more RNA for designation, as does Alternative E; beachgrass management in RNAs would provide additional undisturbed native plant habitat. Non-native vegetation management would not occur at all in Alternative C; therefore, species composition within plant communities may remain about the same as existing conditions or additional habitat and populations of native plant species may be lost as beachgrass continues to expand its range .

While controlling beachgrass may enhance native plant communities, alternatives which include any attempt to control beachgrass (Alternatives A, B, D, F(PA), G, H) would slightly reduce habitat for wildlife species relying on beachgrass cover including various small mammal and bird species, birds of prey and predatory mammals which rely on small mammals and birds as food sources, and for species moving between other habitat types. Although native plants may colonize sand dune habitat following beachgrass eradication, native vegetation would not colonize as densely as does European beachgrass. Alternative F(PA) could result in the greatest loss of cover depending upon success of the beachgrass treatment.

Figure IV-10. Condition of various components of sand dune habitat.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of area disturbed	High	Low	Mod.	Low	V. Low	Mod.	High	Mod.
Level of general human disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Amount of new undisturbed open sand created	Low	Low	None	Mod.	Mod.	Mod.	Low	Mod.
Overall Habitat Condition	Poor	Good	Fair	Excell.	Good	Fair	Poor	Fair

Aquatic Habitats - Lakes, rivers, creeks and estuaries support not only water-dependent plant and animal species (such as submergent and emergent plants, beaver, nutria, many amphibians), but provide escape cover for waterfowl and an important source of dietary water for many other species. Although most water bodies experience some seasonal or annual water level fluctuation, dramatic changes in water level over time would decrease the suitability of this habitat type for both plants and wildlife. However, long-term water level changes (currently evidenced by declining lake levels in some portions of the NRA) are not expected to vary between alternatives. Factors which would affect aquatic habitats and which would vary by alternative include facility construction, recreation levels, and habitat management.

Construction activities in or near aquatic habitats would impact these habitats by temporarily introducing sediments or by changing water flow patterns. Boat dock and pier construction included in all alternatives would have temporary and limited effects on aquatic habitats. These temporary effects would be greatest in Alternatives D, F(PA), G and H which include the construction of several new aquatic-based facilities on NRA lakes (Figure IV-11). However, construction in NRA streams would be limited under Alternatives D, E, F(PA) and H because these alternatives would recommend wild or scenic status for NRA streams (except Alternative D which recommends Siltcoos for recreational status and Alternative F(PA) which does not recommend Siltcoos for any type of Wild and Scenic River status). The remaining alternatives would include some moderate to low level of aquatic-based construction in lakes, but would recommend rivers only for recreational status (which provides little protection against aquatic development) or no Wild and Scenic River status.

Recreation activities in or near water (for instance, in riparian areas) can also affect the quality of aquatic habitats by destroying native aquatic plants, by accidentally introducing exotic aquatic plants which may displace native plants, by introducing toxins or human waste, and by disturbing wildlife species. Aquatic sensitive plant species, which may occur on the NRA, are humped bladderwort, lesser bladderwort, and water-meal. Though areas would be surveyed for these sensitive species prior to allowing recreation or construction activities in an area, potential habitat could be affected by these activities. In addition, a unique melanic (black) aquatic crustacean (*Daphnia* sp.) has been discovered in ephemeral (temporary) pools on the Oregon Dunes NRA. A similar species is found in the Arctic, but none have been described in temperate climates. Temporary pools can be adversely affected by encroaching vegetation, declining water levels and possibly ORVs.

Alternatives which include high levels of aquatic- or riparian-based recreation (Alternatives A, B, D, F(PA), G, H) would slightly reduce the suitability of aquatic habitats. However, general recreation use levels would be lower in alternatives D and H. Facilities constructed in alternatives D, F(PA) and H would be designed to channel users and thereby reduce impacts; these alternatives also include actions designed to reduce riparian impacts which would also reduce impacts to adjacent

aquatic habitats. Wetland management in D, F(PA) and H could reduce impacts from encroaching vegetation by keeping these communities in early seral stages. Proposed beachgrass control that could re-establish sand movement into the deflation plain (Alternative F(PA)) would also maintain or enhance ephemeral pools habitat for this *Daphnia* species.

Because aquatic systems on the NRA are relatively sterile (i.e., support few plant and fish species), aquatic habitats would be highly affected by fish habitat management activities within the aquatic habitat and by plant and wildlife management activities in adjacent riparian habitats. Alternatives D, F(PA) and H include activities designed to enhance both riparian and aquatic habitats; management in these alternatives would enhance fish production and therefore increase populations of fish-eating wildlife species and would provide additional cover for aquatic species. Alternatives A, B and G include some aquatic and riparian habitat management and would enhance some habitats for fish and fish-eaters.

Rapid succession, with concurrent increases in transpiration rates, and groundwater pumping have been suggested as explanations for declining water tables in NRA lakes. Management activities designed to reduce shrub encroachment in wetland habitats may help to maintain water levels in adjacent aquatic habitats. Thus, water levels in aquatic habitats may be maintained longer in Alternatives D, F(PA) and H which emphasize wetlands management.

Figure IV-11. Condition of various components of aquatic habitats.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of localized disturbance (from fishing facilities)	Mod.	High	Mod.	Low	Low	Low	High	Low
Level of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	V. High	Mod.
Amount of fish habitat management	Mod.	Mod.	Low	V. High	None	V.High	Mod.	High
Amount of wetland management	Low	Low	Low	High	V. Low	High	Low	High
Overall Habitat Condition	Fair	Fair	Fair	Excell.	Fair	Good	Fair	Good

Effects on Plant Community and Wildlife Habitat Arrangement and Diversity

Alternatives not only affect specific habitat types, but can also affect the arrangement of habitats and the number of different habitat types present across the landscape (landscape diversity). Habitat arrangement is most important when species require more than one habitat type to meet their life-cycle needs. For example, the red-legged frog spends 3-4 months each year in aquatic habitats, but migrates to upland forests for other parts of the year. The arrangement of aquatic and upland forest habitats is essential to the survival of the red-legged frog. Fragmentation of habitats can affect the long-term viability of native plant species and communities by reducing opportunities for genetic exchange. Habitat fragmentation similarly affects wildlife with limited range of movement as well as losing larger species when habitats become too small to support them. An area is said to be diverse if a variety of habitat types are present in suitable amounts. Increased landscape diversity generally allows for increased species diversity.

Alternatives can affect habitat arrangement, fragmentation and diversity by removing a particular habitat, by providing a physical barrier between adjacent habitats (thereby preventing movement between habitat types), by making a particular habitat unsuitable for plant and/or wildlife, or by removing a plant community. Alternatives can also increase habitat diversity by managing for a range of seral stages within a particular habitat type.

Alternatives A, B and G which increase roads, trails, facilities and recreation use may reduce plant and wildlife community diversity by reducing and/or eliminating those sensitive species, communities (including globally significant plant communities) or habitats which cannot tolerate physical alteration or human disturbance including native sand dune plant communities, early seral stage wetlands and tree islands (Figure IV-12). Reducing the presence of these habitat types would reduce overall area diversity. This loss could have far reaching affects if similar habitats within the coastal-ecoregion continue to be lost. Alternatives which increase ORV use would impact larger areas and could therefore eliminate larger portions of (or entire) communities.

Plant and wildlife habitat diversity can also be affected by recreation use. High recreation use may make some habitats unsuitable for use by wildlife species and result in the loss of some plant communities; as these habitat types are removed from the mosaic of "suitable" habitat, diversity declines. Alternatives A, B and G, which substantially increase recreation use in sensitive areas including beach strand habitats, wetlands habitats, and aquatic/riparian habitats may essentially remove these habitats from the diversity mosaic and further reduce populations of endemic native plant species. Figures II-17 and II-18 compare the quantitative and qualitative effects of the different alternatives on globally significant plant communities. Alternative F(PA) provides the highest level of protection to globally significant plant communities by allocating all known globally significant plant communities

that are in good to excellent condition to MA10(F), which will provide for active monitoring and management to protect and maintain these communities.

Heavy recreation use may also affect the arrangement of wildlife habitats by reducing or eliminating travel between habitat types. Alternatives with high levels of recreation (A, B, G) may result in habitats becoming effectively "isolated" from one another; wildlife species which rely on more than one habitat may decrease.

Stabilization of foredunes by European beachgrass has allowed the European beachgrass community to dominate many sand areas. Control or eradication of European beachgrass may increase plant community diversity by increasing the habitat available for colonization by native plant species.

Plant and wildlife habitat management activities, particularly wetlands management and control of non-native vegetation would affect overall landscape diversity. Alternatives D, F(PA) and H include high levels of both wetland and plant and wildlife habitat management. These alternatives would continue to provide a range of habitat types and seral stages over time. These alternatives also include beachgrass management efforts which would enhance the diversity of native dune vegetation communities. Alternatives A, B, C and G include low levels of wetland and habitat management; the NRA would exhibit lower landscape diversity in these alternatives. Although these alternatives include higher levels of beachgrass management than alternatives D and H, beachgrass control efforts would be focused in areas of high recreational use (both off-road and non-motorized). Therefore, native species habitat would not be enhanced because heavy foot or ORV use prohibits most vegetation from becoming established. There would be minimum or no efforts to control non-native vegetation in Alternatives C and E. The diversity of sand dune plant communities would not be significantly affected by either of these alternatives.

Conversely, controlling non-native vegetation would slightly decrease the amount of wetland plant communities and wetland habitat types. Alternatives which include large areas of beachgrass control west of deflation plain wetlands may slightly reduce wetland plant community diversity if sand encroaches on limited wetland types. Alternative D directs beachgrass control near estuaries rather than adjacent to wide deflation plains. Alternative F(PA) proposes beachgrass control in both estuaries and deflation plains. These alternatives would enhance plant and wildlife habitat diversity the most by creating additional habitat for native plant communities while maintaining important wetland plant communities and habitats.

Figure IV-12. Selected factors affecting habitat diversity and arrangement and overall amount of both provided by each alternative.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Amount of general recreation disturbance	V. High	High	Mod.	Low	V. Low	Mod.	High	Mod.
Amount of non-native vegetation control	High	Low	None	Low	None	High	High	V. High
Amount of habitat managed to maintain diversity	Low	Low	Low	High	None	High	Low	High
Overall Habitat Diversity	Fair	Fair	Fair	Good	Fair	Good	Fair	Good

Figure IV-13. Condition of various plant communities and wildlife habitats.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Condition of forest habitat	Poor	Fair	Fair	Excell.	Good	Good	Poor	Excell.
Condition of riparian habitat	Poor	Poor	Fair	Excell.	Good	Good	Poor	Good
Condition of beach strand habitat	Poor	Fair	Fair	Excell.	Excell.	Good	Poor	Good
Condition of wetland habitat	Poor	Poor	Fair	Excell.	Good	Good	Poor	Fair
Condition of sand dune habitat	Poor	Good	Fair	Excell.	Excell.	Fair	Poor	Fair
Condition of aquatic habitat	Fair	Fair	Fair	Excell.	Fair	Good	Fair	Good
Condition of habitat diversity/juxtaposition	Fair	Fair	Fair	Good	Fair	Good	Fair	Good

Effects on Proposed, Endangered, Threatened and Sensitive Species

Aleutian Canada Goose - None of the proposed alternatives are expected to have any adverse direct, indirect or cumulative effects on Aleutian Canada geese. Because these geese are off-shore migrants which only occasionally use inland bodies of water even high levels of recreation use are not expected to affect them. Further,

none of the alternatives are expected to substantially increase fall use of wetlands or open water habitat which the goose frequents. European beachgrass control may result in eventual sand inundation of portions of deflation plain wetlands. However, larger bodies of water will not be affected by beachgrass control. Those alternatives that include wetland management activities would provide additional potential migratory habitat for this species.

American Peregrine Falcon - The NRA does not provide suitable breeding habitat for the peregrine falcon; foraging habitat consists primarily of early seral stage deflation plains. The importance of the Oregon Dunes NRA as a foraging area and what, if any, level of human disturbance affects foraging peregrine falcons is currently unknown.

None of the alternatives are expected to substantially increase recreation levels in early seral stage deflation plains. High levels of recreation use in or adjacent to wetlands result in adverse impacts to wetlands and associated wildlife. Impacts increase with the amount of interface between ORV riding areas and wetlands. Alternatives A, B, C, F(PA) and G which include many miles of roads, trails, designated routes and or facilities (Figure IV-9) will exhibit the most disturbance and degradation of wetlands. The greater the interface the greater the potential affect could be on foraging peregrine falcons.

European beachgrass management may result in indirect impacts to portions of deflation plain wetlands through eventual sand inundation. Wetland impacts are expected to be minor under all alternatives that propose beachgrass control. Alternatives that include wetland management activities aimed at maintaining early seral stages would provide additional foraging habitat for peregrine falcons.

California Brown Pelican - California brown pelicans rest on dry sand beaches of the NRA during their migration. Increased public use of beaches (either motorized or non-motorized) would increase stress on pelicans and reduce important energy stores. Some minor effects on California brown pelican populations through the reduction of suitable resting habitat could occur in alternatives with miles of beach open to public use. Impacts will range depending on the amount of open beach. Alternatives A, B, C, G provide the most open beach.

Long-billed Curlew - Long-billed curlews use dry sand beaches on the NRA during migration and the wintering period. Increased public use of beaches (either motorized or non-motorized) would increase stress on curlews and reduce important energy stores. Therefore, alternatives that allow public use of beaches could have minor effects on long-billed curlew populations by reducing suitable migratory habitat. Impacts will vary depending on the amount of open beach. Alternatives A, B, C, G provide the most open beach. Because curlews also use deflation plain wetlands during migration and wintering, alternatives that impact this habitat such as recreational use and European beachgrass control could indirectly affect migrating long-billed curlews. Potential for impacts would be the greatest in alternatives that allow for greater recreational use (Alternatives A, C, F(PA) and G) in or adjacent

to wetlands. Alternatives that include wetlands management would provide additional migrating habitat for curlews.

Northern Bald Eagle - No bald eagles are known to nest on the NRA although suitable nesting habitat may exist. Alternatives which greatly increase public use of estuary habitats may slightly decrease the suitability of such areas for foraging eagles. Conversely, alternatives which reroute trails away from estuary habitat or eliminate riparian trails (Alternatives D, E, F(PA)) would enhance those habitats for bald eagle foraging.

Northwestern Pond Turtle - Northwestern pond turtle breed and winter in lakes, ponds and slow-moving streams. Because, none of the alternatives are expected to negatively affect these habitat types, the proposed alternatives are not expected to have any adverse direct, indirect or cumulative effects on northwestern pond turtles. Alternatives which include wetlands management activities aimed at increasing open water would provide additional habitat for pond turtles.

Red-legged Frog - The red-legged frog breeds in lakes, ponds and slow-moving streams and winters in a variety of coastal forest types. None of the alternatives are expected to negatively affect these habitat types. Because red-legged frogs use deflation plain wetlands, management activities in these areas could impact this species. Potential for impacts would be the greatest in alternatives that allow for greater recreational use in or adjacent to wetlands (Alternatives A, C, F(PA) and G). Alternatives which include wetlands management activities would provide additional breeding habitat for frogs.

Pacific Western Big-eared Bat - The Pacific big-eared bat breeds in caves, hollow trees and abandoned buildings; these bats forage near water sources. Because none of the alternatives are expected to substantially decrease snag availability and none would substantially reduce the suitability of deflation plain foraging habitat, none of the proposed alternatives are expected to have any adverse direct, indirect or cumulative effects on Pacific western big-eared bats. Alternatives which include wetlands management activities would provide additional foraging habitat for bats.

Western Snowy Plover - Alternatives with many miles of beach open to ORVs (Alternatives A, C, G), particularly Alternative A which also adds additional foot access, have the greatest potential to disturb both wintering and/or breeding snowy plovers. However, alternatives that allow public use in snowy plover habitat (Alternatives A, B, C, F(PA), G and H) may potentially impact this species. Alternatives which include beachgrass control efforts near the mouths of rivers and creeks (Alternatives D, F(PA) and H) would increase suitable nesting habitat for plover. Other alternatives which proposed vegetation removal would provide some habitat, although human disturbance in these areas might preclude plover use of them.

Several alternatives include actions which would reduce public use in snowy plover nesting habitat including closing portions of the Siltcoos Beach Road (Alternatives D and E), rerouting the Waxmyrtle Trail (Alternatives D and F(PA)) and removing the Tahkenitch Trail (Alternative D). These alternatives would not only reduce loss of plover due to human disturbance, but may also reduce predation on plover in closed areas because predators (opposum, racoon, ravens, crows) are attracted to areas of human use, most likely because of the edible refuse left by human visitors. Alternatives that emphasize wildlife habitat management (Alternatives D, F(PA) and H) would also further enhance snowy plover nesting areas through additional restrictions on human use of snowy plover nesting areas. Alternatives C, D, E, F(PA), H include actions to enhance snowy plover nesting habitat on the North Spit of the Umpqua River. It should be noted that in all alternatives future management for plovers will be dependent on critical habitat designation and recovery plan development by the USFWS. Potential impacts to snowy plover nesting habitats could be partially mitigated for by:

- Prohibiting public use in snowy plover nesting habitat during breeding season (approximately 15 March - 15 September) either by signing and roping, fencing or otherwise designating the area. This action would effectively reduce disturbance to nesting plovers and would decrease the attraction of such areas to predators.
- Requiring that all dogs be leashed adjacent to snowy plover nesting habitat during the breeding season (approximately 15 March - 15 September). This action would be very effective in reducing disturbance of nesting plover if enforcement was a priority.
- Increasing the vehicle closure distance from snowy plover nesting habitat to provide a buffer and decrease the likelihood that closure violations would adversely impact nesting areas. This action would most likely reduce violations somewhat but would be less effective than closing entire beach stretches.

Sensitive Plants - The alternatives are not expected to have any adverse direct effects on known populations of plants with sensitive status. Planning for site-specific projects would include investigations for these plants and appropriate protective actions would be taken if they are found.

However, the alternatives may affect the amount and quality of habitat available for colonization by sensitive plant species. ORV activity on beaches and foredunes decreases the amount of potential habitat available for pink sandverbena. A significant portion of the beach and foredune habitat on the NRA is open to ORVs under Alternatives A and G; these alternatives would reduce potential sandverbena habitat the most. Alternatives C and F(PA) reduce a moderate amount of potential sandverbena habitat and the remaining alternatives maintain greater amounts of potential habitat.

Wetland management is proposed in all alternatives except Alternative E. In general, the types of wetland management activities proposed by the various alternatives would not reduce existing or potential habitat for TES plant species if human use is restricted or channeled away from sensitive areas. Wetland management activities which maintain dune deflation plains in early seral stages would maintain or increase habitat for bog club-moss, water pennywort, and common adder's tongue. Wetland management activities which maintain bogs, marshes and wet habitats would maintain or increase habitat for other TES plant species which have potential habitat within the Oregon Dunes NRA including : Oregon bog anemone, large-awn sedge, several-flowered sedge, Frye's limbella moss, North Pacific plantain, Pohlia moss, wool-grass, humped bladderwort, lesser bladderwort, and water-meal. There are no anticipated environmental impacts to salt marshes, and, therefore, habitat for salt-marsh bird's-beak would not be reduced.

Cumulative Effects

The cumulative effects of a particular alternative on plant communities and wildlife habitats will depend on: 1) the absolute abundance of a particular plant community or wildlife habitat across its regional range, and 2) management activities planned on other lands in similar plant communities or wildlife habitats.

The NRA supports several unique or regionally-limited habitat types including coastal sand dunes, deflation plain wetlands, forested wetlands, tree islands, and salt marshes. In addition, the NRA contains unique, rare and sensitive plant communities and wildlife species. Adverse effects to these communities and/or species as a result of management actions on the NRA may affect regional distribution and abundance. Thus, even minor loss and/or disturbance of communities or species may affect overall species/community abundance over its range. This will be particularly true for such species as the western snowy plover for which the NRA provides breeding habitat for a full one-half of the existing coastal breeding population.

Cumulative effects on more common plant communities and wildlife habitats will also depend on management activities taking place on other state, county, and private lands. The NRA has the opportunity to manage habitats quite differently than adjacent state, federal and private landowners; for instance, NRA forested areas are not subject to commercial harvest and the NRA currently contains many miles of relatively "remote" beach. As tourism and coastal development pressure increases along the Oregon coast, it is expected that beach, sand dune, deflation plain wetland and coastal upland forest habitat will become even more limited. NRA habitats and plant communities may become even more unique and/or rare.

Thus, alternatives which emphasize heavy recreation use, particularly those which emphasize motorized recreation, would have the greatest cumulative effects on the overall distribution, species richness, and diversity of plant communities and wildlife habitats. ORV use has reduced the distribution and numbers of many native plant species which occur in sand dune and beach habitats (Wiedemann 1984). Increased use would further reduce population numbers and fragment their habitat, which

may have a cumulative impact on the genetic diversity and long-term viability of these native species. Impacts to the native plant communities would affect the biodiversity of the region. High recreation use may also have cumulative effects on sensitive wetland habitats, tree islands, and the western snowy plover.

All alternatives allow continued collection of special forest products, such as mushrooms. Depending on harvesting method and the amount of mushrooms collected in upland forested habitats, there could be cumulative effects on the overall health of these ecosystems. A reduction in mushroom populations may affect the future health of tree and shrub species by altering the balance between mycorrhizal fungi and host species.

Mitigation Measures

- Any new trails or facilities in or near riparian areas are not highly developed. Some disturbance would still occur.
- Trails and facilities are designed to channel visitors and to reduce impacts to important wildlife and plant habitats. Disturbance would still occur, but would be localized.
- Campsites in riparian habitat are removed or screened from lakes, rivers or creeks. Removing campsites would significantly reduce impacts; screening would partially reduce impacts.
- Motorized dispersed camping is restricted to designated sites available by permit. Limiting dispersed camping in vegetated, riparian and wetlands would partially reduce impacts.
- Trails in riparian habitat are designed to contact lakes, streams or rivers only periodically or are otherwise screened from water bodies. Disturbance would still occur but would be periodic and limited in time.
- Create buffer zones closed to ORVs around all important habitats. Some adverse effects could still occur if closure violations continued at the present rate.
- ORV designated travel routes are at least 200 feet from waterbodies. Some adverse effects could still occur if closure violations continued at the present rate.
- Recreation facilities designed near meadow habitat are restricted to meadow edges or are screened from some portions of the meadow. Adverse effects would be somewhat reduced.
- Concentrated dispersed camping is limited or prohibited in wetland habitats. Adverse effects would be substantially reduced.

- Dispersed camping is prohibited in tree islands. Adverse effects would be substantially reduced.
- All trails (foot, equestrian, ORV) passing through wetland habitat are maintained at or above adjacent land level. Wetland channelized would be greatly reduced by this action.
- Interpretive signing and/or information is provided to inform visitors about sensitive plant and wildlife habitats. Some effects would be slightly reduced.
- Prohibit ORVs above the toe of tree island slopes to protect soil and soil microorganisms and reduce undermining of trees. Some adverse effects could still occur if closure violations continued.

**Effects of
Plants
and Wildlife
on Other
Resources**

Fish Habitat

- Many actions designed to enhance wildlife habitats in riparian, aquatic and wetland habitats would enhance habitats for fish.

Recreation

- Maintaining diverse plant and wildlife habitats would enhance recreation opportunities for visitors interested in hiking, nature study, nature photography, and wildlife study.
- Some plant and wildlife habitat enhancement activities may affect the visual quality of an area, reducing recreation value for some visitors.
- Some plant and wildlife viewing areas may concentrate visitors, reducing the quality of the area for visitors who prefer remote and/or unstructured recreation opportunities and enhancing the experience for those recreationists who prefer structured recreation.
- Some plant and wildlife enhancement actions may result in closures or voluntary closures of critical or particularly sensitive habitats and reductions in some recreation opportunities.
- Some measures to reduce wetland impacts could limit some recreation opportunities, such as those for dispersed camping.

- Vegetation management under Alternative F(PA) would reduce likelihood and improve ability to control wildfires, thereby enhancing public safety. Vegetation management under other alternatives would do little to reduce the likelihood or danger from wildfire.

Scenery

- The predicted changes in the dune system resulting from the action of the foredune would dramatically affect the scenery by changing the area from an open sand dune landscape to a vegetated complex of hummocks, low hills and steep ridges.
- Changes in plant communities and vegetation patterns may affect scenic views from overlooks, trails, designated travel routes, etc.

Cultural Resources

- There are no anticipated adverse environmental effects on cultural resources that result from predicted changes in plant and wildlife habitats conditions associated with management activities of the alternatives.
- Plant and wildlife habitat enhancement actions would result in more area being surveyed for cultural resources.

Social and Economic Setting

- Managing plant and wildlife habitats would affect local communities by increasing wildlife-related recreation opportunities.
- Managing plant and wildlife habitats would affect local economies by limiting commercial forest products gathering to specific areas and only to those resources in excess of ecosystem health needs.

Assump- tions Used

- If European beachgrass is not controlled or eradicated, it would continue to spread and most open sand would eventually disappear.
- The degree of vehicle closure non-compliance would remain constant over time and across alternatives. Non-compliance can be mitigated, but probably not eliminated through education, management and enforcement.
- Plant and wildlife habitat management activities would achieve the desired results.
- Some habitat management activities would not be permitted within an RNA or within a Wild and Scenic River corridor.

- If demand for mushroom picking is not managed, there would be a decrease in mushroom populations, such as the commercially valuable Matsutake mushroom.
- Tolerance levels of some wildlife species would be exceeded by some alternatives.
- Pink sandverbena may be present on the Oregon Dunes NRA in suitable habitat that has not been surveyed.
- The NRA may support endemic plant species and/or plant communities which are not found elsewhere in the geographic region.

**Incomplete/
Unavailable
Information**

- Cumulative effects on viability of maritime plant species that are endemic to our area, such as: yellow sandverbena, dune bentgrass, silver bursage, American glehnia, beach pea, seashore bluegrass, black knotweed and dune tansy.
- Cumulative effects from a reduction or loss of native plant communities and their habitats.
- Effectiveness of habitat improvement projects in various habitats.
- Tolerance levels of various wildlife species residing and/or using NRA habitats.
- Relative number of snags and dead and down material per acre.
- Compatibility of riparian habitat management with Wild and Scenic River management.
- Distribution and abundance of the sensitive plant, pink sandverbena on NRA beaches and foredunes.
- Distribution and abundance of melanic *Daphnia* on NRA lands. Effects of management activities on the long-term viability of this species.
- Long-term cumulative effects from recreational and commercial harvesting on population viability of mushroom species and associated wildlife and on the ecology of mycorrhizal fungi.
- Cumulative genetic effects on viability of native plant populations due to habitat fragmentation by ORVs.

ENVIRONMENTAL CONSEQUENCES ON FISH

Direct and Indirect Effects

Long-term changes in groundwater levels and resultant declines in lake surface areas is a major factor determining quantity of fish habitat in lakes. Reduction in lake surface areas is expected to continue in all alternatives given continued water pumping (see Water, Chapter III) and/or continued changes in climate and vegetation.

Further declines in lake water levels will result in more losses of fish habitat. Habitat has disappeared in lakes such as Bluebill that have dried up completely during the last 20 years. Elsewhere, both lake depth and lake acreage have declined, contributing to heavy aquatic plant growth. It appears that a critical stage is reached in many lakes when the maximum depth drops to 10-15 feet. Merritt and Davies (1991) found that Snag Lake - with a maximum depth of 10 feet - was choked with aquatic plants to the point that they could not locate any of the 4 species of fish present 18 years before. (Snag Lake dried up in September 1992.) Although data has not been collected recently, maximum depths in nearby lakes are also approaching 10 feet.

For a more thorough discussion of effects of the alternatives on sediment, water quality and lake levels, see Environmental Consequences on Watersheds, Chapter IV.

Fish Habitat

Increases in amount of recreational fishing resulting from more access and facilities in all alternatives except Alternatives C and E probably would not significantly affect fish habitat in lakes and streams. Effects would be largely limited to more indirect ones on vegetation and soil surrounding these water bodies (see Watersheds, Chapter IV).

The greatest effects of the alternatives on fish habitat would be improved habitat quality resulting from various types of habitat enhancement projects. Alternatives D, F(PA) and H include projects that would add nutrients, increase structure, and control macrophytes (aquatic vegetation) in 200-300 acres of water. Alternative E does not include fish habitat enhancement projects, while the other alternatives (Alternative A, B, C, G) include intermediate amounts (Figure IV-14).

Figure IV-14. Aspects of the fishery program and their effects on fishing and fish populations.

Relative Effects	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Habitat Improved (Acres)	80	80	20	290	0	290	100	200
Fish-Related Facilities (Number)	9	12	6	11	5	10	9	11
Fishing Trails (Miles)	0	4	0	3	0	2	0	2
Fishing Pressure (Relative)	Mod.	High	Mod.	High	Low	High	Mod.	High
Potential for Overharvest								
Lakes	Low	Mod.	Low	Mod.	Low	Mod.	Low	Mod.
Streams	Mod.	High	Mod.	High	Low	High	Mod.	High

Log and boulder structures placed in selected streams (like Saunders, Clear and Eel creeks and tributaries of Elbow Lake) would create resting pools for young salmonids, gravel beds in sand-bottomed areas, and unimpeded flows for adult salmonids migrating upstream to spawn.

In these same alternatives, wood and brush structures would be placed in selected lakes (like Carter and Butterfield lakes) to provide additional cover for warmwater fish. Rigid and floating platforms and bundles of brush and small trees would provide refuge from predation and surface area for food items.

These alternatives could also add nutrients to relatively sterile lakes (like Carter) to increase primary production and the lake's capacity for fish production. Nutrients would increase floating microscopic organisms (plankton) and limit penetration of light into the water, thus reducing dense growths of rooted macrophytes. This would diversify structure of fish habitat in the lake, result in more balanced predator-prey relationships, and improve growth rates within the fish community. Other ways to control macrophytes include drawdown of lake levels to dry out the plants, cutting and removing plants mechanically or by hand, placing mats of various materials that cover up the lake bottom and prevent plants from becoming rooted, and biological control using organisms such as vegetarian crayfish or grass carp. Herbicides may also be considered.

Management for certain Wild and Scenic Rivers in all alternatives except A and C would preclude dam construction, thus maintaining free flows, unimpeded passage, and other aspects of fish habitat present at this time. Wild and Scenic designation could limit opportunities to create new fish habitat because of restrictions on the type of enhancement structures that would be appropriate.

Presence of cultural sites along lakes and streams may require relocation or modification of planned fish habitat enhancement projects.

Fish Populations in Lakes and Estuaries

All alternatives except Alternatives C and E provide more access to lakes and estuaries and additional facilities such as lakeside campgrounds, boat ramps, and fishing docks (Figure IV-14) and would increase numbers of anglers and harvest of fish and shellfish. This is not likely to harm (and may actually benefit) populations of warmwater panfish like bluegills and yellow perch, but may reduce numbers of large predators like largemouth bass and stocked rainbow trout.

As discussed in the Fish section of Chapter III, appropriate regulation of catch by ODFW will be important in minimizing any negative effects of the alternatives on fish populations. Increases in angling pressure would increase the possibility that ODFW would stock more fish in given lakes, including more non-native species.

Overharvest to the degree that it threatens population viability would not be acceptable, and would be prevented by more restrictive angling regulations by ODFW and/or limitations on access by the Forest Service.

The magnitude of benefits of habitat projects to lake fish can not be predicted precisely. In general, project objectives would include either increasing or reducing vulnerability of prey fishes to sport species like largemouth bass. Additional structure would increase shaded habitat and would provide interstitial hiding places and overhead protection from predators. Reduction of macrophytes would have opposite effects by making smaller fish more vulnerable. The type of project appropriate for a given lake depends on the environmental conditions and fish community present (see Fish, Chapter III) and opportunities to provide access and facilities for anglers. Adding fertilizer would favor those species and life stages of fish that feed directly on plankton.

Fish Populations in Streams

Adult fish pass quickly upstream through 2 miles of sand-dominated stream on the Oregon Dunes NRA, and young salmonids also migrate rapidly downstream to the ocean through these same reaches. These areas contain little habitat other than some holding pools for adults; thus population size is determined largely by spawning and rearing conditions in streams (and interconnected lake systems) upstream from the NRA boundary.

Providing more access and facilities near streams in Alternatives B, D, F(PA) and H could increase harvest of wild adult coho salmon and steelhead, which may not be desirable in view of the depressed runs at this time. Any planning for such projects will consider current status of stocks as viewed by ODFW and other fisheries management agencies.

Any stream enhancement activities in tributaries in Alternatives like D and F(PA), and other aspects of all alternatives would at most have localized effects on salmonid habitat that probably would not influence size of anadromous fish runs.

Cumulative Effects

Timber harvesting and other development on Forest Service, private, and state lands in upper tributaries of streams that flow through the Oregon Dunes NRA have influenced fish habitat and runs of anadromous fish in those areas. Because such small portions of the basins of these streams occur on the NRA and because most activities are recreational in nature and have minimal impacts on riparian areas, none of the alternatives - even A and B which encourage large increases in human use - would have significant impacts on stream habitat when added to losses due to management activities upstream.

Because of the high value of local wild salmon and steelhead stocks, the Forest will seize opportunities through ongoing watershed restoration programs to work cooperatively with upstream landowners to protect and restore water quality and other components of fish habitat.

Larger lakes like Siltcoos and Tahkenitch are largely on private land, and any localized changes in fish habitat on the NRA portion due to the alternatives would not be significant when added to changes due to management activities on and around the rest of the lakes. Most of the smaller lakes do not have inlets and no cumulative effects are expected.

The small estuarine areas on the Siltcoos River and Tahkenitch and Tenmile creeks are almost entirely on NFS lands. Although the effects of all upstream management accumulate in these areas, none of the alternatives proposes actions that would make significant changes in estuaries when added to other impacts.

Mitigation Measures

- Trails or facilities in or near riparian areas would not be highly developed to limit the amount of recreational use and disturbance in these areas. Some disturbance from use is still expected, however.
- The primary measures taken at the project level to mitigate effects on fish habitat would be precautions taken to minimize sedimentation and other impacts of constructing such facilities on riparian soil and vegetation, and to prevent degradation of water quality. In part because of physical and ecological conditions at the NRA, these measures are expected to prevent any significant effects (see Watershed, Chapter IV).

Effects of Fish on Other Resources

Recreation

- Reducing dense growths of macrophytes that interfere with fishing would improve recreation opportunities. Other increases in fish habitat would also lead to increased fish populations and an increase in recreation opportunities.
- As fishing opportunities increase, interpretation would become important in reconciling angler expectations with a particular systems ability to produce fish.

Plant Communities and Wildlife Habitat

- Increases in fish habitat may affect amounts of habitat and food for other aquatic wildlife, and also increase food supplies for piscivorous species like otters, osprey and bald eagles.
- Increased angling activities may result in localized disturbance of aquatic and riparian plant and wildlife species.

Social and Economic Setting

- More recreational fishing would increase revenues in local communities. Increases in habitat that result in more salmon and higher commercial catches (expected to be small, at most) could also benefit local economies.

Cultural Resources

- Fish habitat improvement projects along streams and lakes could lead to discovery of cultural sites and require mitigation and protection of the sites.

Watershed

- Projects to reduce macrophyte levels in lakes could temporarily increase organic and inorganic sediments in outlet streams.

Assumptions Used

- Enhancement projects have their desired effects on habitat.
- Habitat is fully used by fish, and more habitat leads to greater and healthier fish populations.
- Increased angling pressure produced by more fishing opportunities will not seriously harm fish populations.

**Incomplete/
Unavailable
Information**

- Angling pressure and catch rates on the NRA at the present time.
- Effectiveness of habitat improvement projects in lakes.
- Resiliency of warmwater fish populations in dunes lakes to angling.
- Whether some anadromous fish stocks should be federally listed.

ENVIRONMENTAL CONSEQUENCES ON THE RESEARCH NATURAL AREAS PROGRAM

Direct and Indirect Effects

Alternatives can affect opportunities for research, education, long-term monitoring and maintenance of biological diversity on National Forest System lands, depending on whether or not the alternatives allocate Research Natural Areas (RNAs) for establishment.

Currently, the Oregon Dunes NRA contains 2 potential RNAs: Umpqua Spit and Tenmile Creek. These areas were chosen because they contain typical and unique habitats found in coastal ecosystems and are considered the best possible examples of these features available for protection. Alternatives A and G would not allocate either RNA for establishment; hence opportunities would be lost for permanent protection of long-term research and monitoring of dune ecosystems. Alternatives B, D and F(PA) each allocate 1 RNA for establishment (although F(PA) designates a smaller area). This will allow limited opportunities for research, education and monitoring, as each RNA contains unique attributes. Alternative B allocates Umpqua Spit, while Alternatives D and F(PA) allocates Tenmile Creek. Features unique to Umpqua Spit are relatively inactive, red fescue-dominated dunes, a red alder/willow sedge marsh, parabola dune complex, mature dune ridge forest, and a population of bog clubmoss, a sensitive plant. Umpqua Spit would allow many research opportunities in deflation plains, as it supports the most extensive grass, sedge and rush deflation plain communities in the NRA. Features unique to Tenmile Creek are high, active, seashore bluegrass-dominated dunes, tree islands (2 islands contain Douglas-fir/western rhododendron dune ridge forests, which are only known from 2 other tree islands within the NRA), freshwater lakes and ponds, and interior dune complex. Tenmile Creek would allow research opportunities on coastal ecosystem development and dune movement as the area contains examples of all major dune features, except parabola dunes. The reduced Tenmile Creek RNA recommended in Alternative F(PA) contains the same range of attributes, but includes only 1 tree island. Alternatives C, E and H would allocate both Tenmile Creek and Umpqua Spit areas for RNA establishment thereby maximizing research, education and long-term monitoring opportunities and providing the greatest opportunity to preserve in perpetuity unique examples of coastal dune species and habitats.

Cumulative Effects

The 2 potential RNAs contain features such as seashore bluegrass-red fescue unstabilized dunes, which have largely been displaced in the Pacific Northwest by land development, stabilization of dunes with exotic and native species, and logging (Alpert 1984). Cumulative effects from alternatives which do not allocate both areas for RNA establishment would result in regional, and possibly a global, loss of opportunities to protect in perpetuity these unique coastal ecosystem features.

Mitigation Measures

Umpqua Spit and Tenmile Creek areas were selected for study as potential RNAs following lengthy study of available habitats in the Pacific Northwest. They are the best examples of typical and unique coastal features available for RNA designation. If alternatives do not allocate these areas for RNA establishment, no possible mitigation measures exist.

Effects of RNAs on Other Resources

Recreation

- Non-motorized recreationists would have opportunities to observe undisturbed, unique, natural dune features.
- Many recreation activities would be precluded from areas allocated for RNA establishment.

Plant and Wildlife Habitats

- Allocating the Umpqua Spit and Tenmile Creek areas for RNA establishment would afford long-term protection for native plant species and their habitats.
- Because RNAs do not permit high-impact recreation use, RNA allocation would provide suitable habitat for some wildlife species which require undisturbed habitats.
- Allocating RNAs for establishment would preclude some wildlife habitat management activities.
- Wetlands, such as dune deflation plains and willow sedge marshes, would be protected from human disturbance.
- Early seral stage wetlands would become uncommon as wetlands succeeded over time.
- Aquatic habitats, such as ephemeral pools, would be protected from human disturbance.

Scenery

- In Tenmile Creek, quality of scenery would remain the same as current conditions, or could decrease over time if European beachgrass significantly expands into the area and stabilizes the moving dunes. In Umpqua Spit, quality of scenery may increase due to exclosure of motorized vehicles, or could decrease due to European beachgrass encroachment.

Cultural Resources

- Few or no ground-disturbing activities would take place in lands allocated for RNA establishment. Undiscovered cultural resources would be protected, but data collection associated with site discovery would be precluded.

ENVIRONMENTAL CONSEQUENCES ON WILD AND SCENIC RIVERS

Direct and Indirect Effects

Effects on a potential wild and scenic river depend to some degree on whether or not it is designated as a wild and scenic river by Congress, and, if it is, what classification it is given and what land is included within the boundaries.

Figure IV-15 shows which streams would be recommended for wild and scenic river designation in each alternative. It also shows the total acreage which would be included within the river area boundaries (including private land), by classification (wild, scenic or recreational), assuming that the boundary would be located $\frac{1}{4}$ mile from the stream on each side, the maximum allowed in the Wild and Scenic Rivers Act.

Figure IV-15. Probable acreage of wild and scenic rivers recommended in alternatives

Stream	Alternatives							
	A	B	C	D	E	F(PA)	G	H
Siltcoos River								
Classification	*	Rec.	†	Scenic	*	*	Rec.	Rec.
Acres	0	525	0	525	0	0	525	525
Tahkenitch Creek								
Classification	*	Rec.	†	Scenic	Wild	Wild	Scenic	Wild
Acres	0	770	0	770	770	770	770	770
Tenmile Creek								
Classification	*	Rec.	†	Scenic	Wild/ Scenic	Scenic	*	Wild/ Scenic
Acres	0	1,500	0	1,000	830/170	1,000	0	830/170
Acreage by Classification								
Recreational	0	2,795	0	0	0	0	525	525
Scenic	0	0	0	2,295	170	1,000	770	170
Wild	0	0	0	0	1,600	770	0	1,600
Total Acreage	0	2,795	0	2,295	1,770	1,770	1,295	2,295

* not recommended for designation - river area allocated to other management area(s).
†not recommended for designation but eligibility would be maintained.

In general, a classification of wild would provide more protection of a river's values than scenic, and scenic more than recreational. From this standpoint, Alternative H would offer the most protection since all three streams are recommended for designation, two of them predominantly in the wild classification. However, if a stream is designated, final boundaries must be determined and a management

plan must be prepared. The specific boundaries and management direction included in the plan also play a key role in the effects which would likely occur.

Even though the specific details of a management plan are not available at this time, general effects can be described based on the designation and classification recommendations in each alternative and the general management program described in Chapter II.

General Effects

Generally, based on current information, there would not be major difference in effects on the streams under any of the alternatives, whether designated or not. This is because there are no known plans or proposals for dams, major developments, or other activities which would cause large changes in the streams or their adjacent land areas. And, since the streams are predominantly located within a National Recreation Area, the management direction would not be substantially different. Eligibility for all the streams would be maintained in all alternatives. The biggest exception to this would be in the Tenmile Creek area, where Alternative B would recommend designation of over two miles of private land. The reasonably foreseeable effects on these streams are described below.

Effects on Siltcoos River

Effects on the Siltcoos River come primarily from the recreation developments within the corridor and along the shoreline, and the recreation uses these facilities generate. In addition there would be some minor effects from wetland and wildlife habitat activities within the river area. The alternatives can be grouped into those which keep recreation development at about the same level as present, those which increase development, and those which reduce development.

Development About Same as at Present—In Alternatives C, F(PA), G and H, the developed recreation sites would all be essentially the same as at present. This is a river corridor in which there is a high-standard, paved road and several highly developed recreation sites. Many people use the corridor, and during the summer months it fairly bustles with activity. In Alternative C (designation not recommended but eligibility maintained), ORVs would be the predominant users, and associated with that is quite a bit of noise and traffic.

In alternative F(PA) (designation not recommended) existing facilities along the Siltcoos River and Road would be closed to use of ORVs. However, Driftwood II Campground (CG) and a new overflow campground/day-use staging area would be available for ORVs. Both these CGs are outside the corridor and would be staging areas for riding which would also be outside the corridor. Only street-legal ORVs would be permitted to operate on Siltcoos Road. Traffic and noise would probably be less than current. It is anticipated that the existing facilities would be used by non-ORV users, although it may take some time for this transition to occur.

In Alternative G (recreational river), existing facilities along the Siltcoos River and Road would be closed to ORVs. However, Driftwood II Campground (CG) and a new CG would be available for ORVs. Both these CGs are outside the corridor and would be staging areas for riding which would also be outside the corridor. ORVs would still use the Siltcoos Road for access to these CGs, but traffic and noise would probably be much less. It is anticipated that the existing facilities would be used by non-ORV users, although it may take some time for this transition to occur. It is expected that traffic and noise would be less in this alternative than in Alternative C.

In Alternative H (recreational river), the whole NRA is closed to use of ORVs, so this should result in noise and traffic somewhat less than in Alternative G. In all these alternatives there would be substantial presence of humans within the river area and along the shoreline.

Alternatives That Increase Development—Alternatives A and B increase the level of facility development within the corridor, although not substantially. Of all the alternatives, the Siltcoos corridor would be most highly developed in Alternative A (designation not recommended). There would be a major new CG developed, probably just north of the corridor, and the Waxmyrtle road would be gravelled and open year-round. The corridor would remain fully open to use of ORVs. Noise, traffic and the general level of activity would be highest in this alternative, but would not be substantially greater than at present.

Alternative B (recreational river) does not add any new major recreation developments but does add a few minor wildlife-related ones which could be located close to the river. They would generate a bit more use close to the river, but the impacts would not be great. The corridor would be closed to ORVs, so the overall effects would be fairly similar to those in Alternative H.

Alternatives That Decrease Development—Alternatives D and E eliminate the Siltcoos Beach parking lot and move the end of the Siltcoos Road back from the beach. In addition, they close the corridor to use of ORVs. Alternative E (designation not recommended) pulls the end of the road back the farthest, about ¾-mile, to the present location of the Lagoon CG entrance. Lagoon CG is eliminated and replaced with a parking lot. Driftwood II CG is eliminated. Waxmyrtle CG would be reduced in size, converted to a less highly-developed, walk-in CG, and the riverside units removed. This alternative still keeps both bridges, and much of the road that is adjacent to the river. However, it would reduce the number of facilities, people and traffic in the corridor substantially. This would make Alternative E the least developed and least crowded.

Alternative D (scenic river) shortens the Siltcoos Road to the Stagecoach Trailhead parking, a reduction of about ⅔-mile. The riverside units in Waxmyrtle CG would be eliminated as would Lodgepole and Driftwood II CGs. Some minor wildlife-related facilities would be added on or near the river bank. This alternative would be

somewhere between Alternatives H and E in terms of level of development and general activity.

Effects Common to All Alternatives—In all alternatives, wildlife habitat improvement activities would be aimed at protecting populations of snowy plover, a sensitive species, and maintaining or improving wetlands. Although the specific activities would vary somewhat in the different alternatives they all would generally be low-key and not visually intrusive. It could involve closing some areas during nesting season (approximately March 15 through June 30) which would restrict use of a small part of the river corridor for a portion of the year.

The dam that creates the upper end of the eligible segment of the Siltcoos River is operated by International Paper Company to maintain water in Siltcoos Lake for possible use in their Gardiner Mill if Tahkenitch Lake is not sufficient in a time of drought. Part of the operation involves a "flushing" of the stream just prior to the start of salmon runs to wash out any blockages and make the runs easier. This creates a short-term surge which could have a minor effect on any recreationists on the river. This is a traditional use which would be maintained in the future.

Effects on Tahkenitch Creek

The effects on Tahkenitch Creek would vary little among the alternatives. This is because, in all alternatives, even those where Tahkenitch Creek is not recommended for designation, there would be no developments (other than a trail and trail bridge in all alternatives), and the land on both sides of the river area would be closed to ORVs. The main difference is that in Alternatives D, E, F(PA), G and H there would be some minor work done near the mouth of the creek in order to improve habitat for the western snowy plover, a threatened species. This work could involve some relatively unobtrusive signing at the estuary, rope closures around nest sites during nesting season and European beachgrass control. These activities temporarily would slightly reduce the natural appearance of the area and could restrict a small part of the river area from access during the same portion of the year as the Siltcoos River.

Recreation use of the river area is expected to be relatively light in all alternatives due to the lack of recreation facility development. The presence of the trail will increase the numbers of recreationists over what presently use the area, but this will still be light use. In those alternatives where designation is recommended, slightly more people may use the stream than in the other alternatives due to the notoriety of designation. In all alternatives levels of solitude should be relatively high other than right at the trail.

International Paper Company's dam at the upper end of the eligible section is operated similarly to the Siltcoos River dam. The effect of flushing the channel prior to salmon runs could be more significant for recreationists on Tahkenitch Creek because the stream flows through a narrower and more restricted channel

so a minor "wall" of water could be created. This could be a hazard to someone on the stream who was not aware it was coming, although it would be at time of year when fewer people would likely be on the stream. As with the Siltcoos River, this is a traditional operating procedure which would not be affected by designation.

Effects on Tenmile Creek

All 5 miles of Tenmile Creek are eligible for inclusion in the National Wild and Scenic River System. However, the lower several miles of stream are predominantly National Forest land, while the upper 2 miles are all privately owned. In order to look at the full possibilities for designation, Alternative B recommends designation of the whole stream with a recreational classification. In the other alternatives where designation is recommended, D, E, F(PA) and H, the recommendation is limited to the lower 3 miles, the place where the stream first enters National Forest land, and where the outstandingly remarkable values are most evident.

In Alternative B (recreational river), development of all the private land along the stream would be reduced from what it would likely be without designation. This would result in this portion of the stream having a more natural appearance. In Alternatives A, C, D, E, F(PA), G and H, the streamside land in the upper 2 miles, which is already partly developed with homes, docks, marinas, etc., would likely continue to be developed due to its proximity to the community of Lakeside and Highway 101. This would reduce the natural appearance of this segment of the stream.

Approximately ¼-mile of land in the lower 3 miles of stream is privately owned. This land is included in the segment of stream which is recommended for designation in Alternatives D, E, F(PA) and H. It would be given a scenic classification in all these alternatives, so development of this land would be much less than it would likely be in alternatives where it would not be designated. The land would therefore appear much more natural, especially as seen from the stream.

There are no developments planned on National Forest land in the lower 3 miles of the stream in any alternative. The major effect in the lower 3 miles would come from ORV use. Some additional minor effects would come from wildlife habitat and wetland improvement work, and from recreation use of the river area.

In Alternatives A and G (designation not recommended) both sides of the stream are open to ORV riding in open sand or on designated routes. In Alternative G a bridge would be built across Tenmile Creek to allow uninterrupted off-road riding all the way from the Horsfall area to the Umpqua Beach area. In both these alternatives, the noise and impacts to vegetation from the ORVs would reduce the natural appearance and solitude of the river area.

In Alternative D (scenic river), and Alternatives E and H (wild river), both sides of the stream would be closed to ORVs. Since no trails are planned in the river area in these alternatives, recreation use would probably be relatively light except

right around Spinreel CG in Alternatives D and H. In all these alternatives, the natural appearance and solitude would remain high, but especially in Alternative E where Spinreel CG and day-use facilities would be removed.

In Alternative B (recreational river), Alternative C (designation not recommended but eligibility maintained), and Alternative F(PA) (scenic river), ORV use is allowed only on the south side of the stream. Effects on natural appearance and solitude would be intermediate between the alternatives where both sides of the stream would be open and the alternatives where both sides of the stream would be closed.

Effects caused by enhancement of snowy plover habitat and wetlands in Alternatives D, E, F(PA), G and H, would be similar to the minor effects of those activities on Tahkenitch Creek.

Cumulative Effects

No cumulative effects on potential wild and scenic rivers have been identified.

Effects of Wild and Scenic River Designation on Other Resources and Uses

No effects of designation have been identified on other Forest Service resource programs for the Oregon Dunes NRA. This is due largely to two reasons: 1) in general, the management purposes and goals of the Oregon Dunes NRA are similar to the purposes and goals of the National Wild and Scenic Rivers System, and 2) the classification options analyzed are compatible with the overall management strategies for the alternatives. For example, wild river classifications are recommended only in those alternatives where ORV use has been eliminated as part of the overall management direction.

On the other hand, wild and scenic river designation could very well have effects on use of other properties that would be located within the boundaries of a designated stream, or that, through their operations outside the boundary of a designated stream, might have direct and adverse effects on the values for which the river was established. An example of the first case would be private land included in the boundary of a Tenmile Creek Wild and Scenic River. In such a case, the Forest Service would negotiate with the owner of the private land to assure that the land was managed in a way compatible with the classification and management plan that would be developed. An example of the second case would be if the owner of land upstream from a designated portion of a stream wanted to construct a dam which would alter the flows of the stream to the point where the stream would no longer be considered to be free-flowing.

Assumptions Used

- The recommended designations in the alternatives would actually be enacted by Congress and implemented.

- Developments, activities and uses as described in Chapter II would be implemented.
- Management plans that would be developed for designated rivers would provide management direction similar to the management direction included in the FEIS.
- Boundaries of designated wild and scenic rivers would be ¼-mile from the high water mark on each side of the stream.

**Incomplete/
Unavailable
Information**

- It is not known whether a preliminary administrative recommendation for wild and scenic river designation included in an EIS would be transmitted to Congress unchanged by the Chief of the Forest Service, Secretary of Agriculture and the President of the United States, and if it would be, whether Congress would follow the recommendation.
- Whether the other developments, activities and uses proposed in the various alternatives would be adopted and implemented as proposed.
- What management direction would be included by Congress in an Act designating a wild and scenic river, and what subsequent management direction would be included in the management plan which must be prepared for every wild and scenic river.
- What termini and boundaries Congress might establish for any of these streams it designates as a wild and scenic river.

ENVIRONMENTAL CONSEQUENCES ON SOCIAL AND ECONOMIC SETTING

Direct and Indirect Effects

The alternatives affect the social and economic settings of local communities primarily through the recreation mix each provides. Other resource objectives (vegetation management; RNA allocation; wetlands management; fish, wildlife, and plant habitat management; and Wild and Scenic River designation) would affect communities primarily through their influence on recreation resources and opportunities.

The effects of the alternatives on local communities are assessed in terms of:

- economic impacts resulting from Oregon Dunes NRA recreationists' expenditures;
- National Forest payments to counties; and
- quality of life for local residents.

Economic Impacts

Expenditures by Oregon Dunes NRA visitors contribute significantly to the economy of the surrounding area. A 1991 economic impact analysis of Oregon Dunes NRA visitors evaluated the economic interdependence between the NRA and local firms and industries (USDA Forest Service 1991). In 1990, under the current management plan, Oregon Dunes NRA recreationists generated an estimated \$161.4 million in total income (1993 dollars) and 5,214 jobs in Coos, Douglas and Lane counties (the "area of influence" around the NRA). Of this amount, the relative proportion of total income dollars generated by 5 different categories of recreationists studied was: 60% by non-beach day users; 22% by other users; 13% by ORV users; 3% by anglers; and 2% by campers. Non-beach day-users include visitors who categorize themselves as sightseers, pleasure drivers, picnickers, horseback riders or bicyclists. Other users include categories such as hikers/walkers, birders, photographers, wildlife viewers, mushroom/berry collectors, windsurfers and participants in a variety of other activities.

Future contributions by Oregon Dunes NRA visitors to the local economy will depend on which recreation opportunities are available there, and on visitation levels (i.e., on supply and demand). Available recreation opportunities at the NRA will vary by alternative. Future visitation levels depend in turn on a number of factors (e.g., population growth, personal income, changing recreation preferences, other recreation options). Because these factors are difficult to predict, we have assumed that visitation levels at the Oregon Dunes NRA will increase 3% per year

over the ten-year planning period, based on a projected 30% increase in outdoor recreation in Oregon by the end of the decade (Dean Runyan Associates 1989).

To estimate future economic contributions by Oregon Dunes NRA visitors under different alternatives, we have limited analysis to recreationists for whom the NRA is the primary destination (excluding those for whom the NRA visit is incidental or secondary). On the basis of data contained in the 1990 visitor survey, we estimate that these recreationists generated \$73.6 million of total income in the three-county impact area, with 41% coming from non-beach day-users, 28% from ORV users, 23% from other users, 5% from anglers, and 2% from campers. Using these figures, estimates of average annual total income generated by these visitors over the next decade were calculated and are displayed in Figure IV-16 (1993 dollars) for each of the alternatives. The assumption was made that recreationists' expenditures will increase at a rate of 3% per year (in proportion with visitation) through the ten-year planning period for all recreation activities until, for some activities, NRA capacities are reached (and expenditures thereafter level off).

For all alternatives except E and H, estimated average annual total income varies little (\$89.2-\$91.1 million). This small variation is due largely to the fact that non-beach and other uses, which together contribute 64% of the dollars, can increase with little or no constraint under these alternatives. Alternative H generates less income (\$65.2 million) because of the elimination of ORV use. Alternative E generates the least income (\$30.4 million) due to reduced capacities for all types of recreation use (including elimination of ORV use).

Figure IV-16. Economic effects on local communities.

	ALTERNATIVE							
	A	B	C	D	E	F(PA)	G	H
Total income, average annual (million dollars) ¹	91.1	89.7	90.6	89.2	30.4	89.6	91.1	65.2
Payments to counties, average annual (dollars) ²	33,200	33,200	32,400	28,400	21,800	32,400	33,200	32,400

¹ Includes only visitors for whom the NRA was the primary destination.

² Payments to Coos, Douglas and Lane counties from NRA revenues only (i.e. campground fees, special use fees, etc.)

Payments to Counties

In the 1991 fiscal year, the Oregon Dunes NRA collected approximately \$210,000 in recreation and special use fees, \$27,000 of which was distributed to Coos, Douglas and Lane counties. The estimated average annual payments (over the next decade)

to Coos, Douglas and Lane counties derived from NRA receipts are shown in 1993 dollars in Figure IV-16.

These figures show that there is a slight increase in payments to counties from Oregon Dunes NRA receipts for all alternatives except Alternative E, and that there is relatively little variation among the other alternatives.

Quality of Life

The Oregon Dunes NRA contributes to the quality of life of local residents by providing employment income and a variety of amenities and nearby recreation opportunities. It is believed that none of the alternatives varies enough from the present management plan (Alternative C) to greatly alter community character, but that each modifies the physical environment, amenities or economic conditions of some local residents as described below.

Congestion - A multi-year Oregon Department of Transportation study of traffic on U.S. Highway 101 has indicated a 6-7% annual increase in traffic between Coos Bay and Florence (P. Mather, pers. commun.). Alternatives that increase recreation capacity (Alternatives A, B, G) may allow for higher visitation levels which could lead to further increased traffic and congestion, and increased pressures on community infrastructure and services.

Property Values - Generally the presence of large tracts of scenic, undeveloped land, such as the Oregon Dunes NRA, in close proximity to communities adds to property values. Some residential property values are likely to be impacted by changes in recreation activities offered at the Oregon Dunes NRA. The direction and degree of change in property values would depend on proximity of the property to the Oregon Dunes NRA, and whether prospective property buyers view the changes as positive or negative. For example, Alternatives B, D, E, F(PA) and H, which curtail or eliminate ORV use, may induce increases in values of some adjacent properties if buyers seek to avoid ORV-related disturbances. Likewise, Alternatives A, C and G (which maintain or expand current levels of ORV use) may result in reduced property values assuming homebuyers with similar concerns. Conversely, buyers seeking proximity to ORV recreation opportunities may have the opposite impact on property values under these alternatives.

Employment Opportunities - Estimated total income generated in the area of influence by Oregon Dunes NRA visitors will increase for all alternatives except Alternatives E and H, which show a decline due to reduction or elimination of some recreation activities. For the other alternatives, it is likely that total income increases would be accompanied by increases in total number of jobs, with little variation among the alternatives. It is still possible that there will be some job losses in businesses which are dependent on particular types of recreation. An example would be a decline in ORV-related jobs under alternatives which curtail ORV recreation in some parts of the Oregon Dunes NRA.

In addition to visitor's recreation expenditures, some employment opportunities would also be provided by Forest Service expenditures for removal of non-native and other encroaching vegetation. For all the alternatives except C, E and F(PA), 10 to 16 acres of non-native vegetation would be treated each year, at an estimated annual labor cost of \$20,000 to \$350,000 (see Figure II-17). Alternative F(PA) proposes a more aggressive vegetation management program. Annual acreages treated will vary depending upon cost effective technology development and funding. This work would most likely be accomplished through contracts, generating additional employment opportunities.

Commercial collection of special forest products on the NRA could provide limited employment opportunities. With a limited area and other management mandates, the NRA special forest products program would not be large nor a major contributor to local economies. 25 percent of fees collected for commercial and personal-use forest products gathering permits would be returned to the counties.

Cumulative Effects

The effects of Oregon Dunes NRA visitation on local communities would also depend upon the supply and prices of recreational opportunities on other ownerships (both public and private) in the area. Information on the relative economic importance of travelers to other recreation destinations in the area is unavailable. (The 1991 economic impact analysis discussed above and in Chapter III focused on economic contributions of recreationists whose primary destination was the NRA.)

Effects on Other Resources

Recreation - Commercial mushroom harvest may compete with recreational harvest opportunities and could discourage other recreational pursuits in harvest areas.

Plant Communities and Wildlife Habitat - Commercial gathering of special forest products, especially mushrooms, may reduce the suitability of the habitat for some plant and wildlife species.

Soils and Geology - Commercial mushroom harvest would increase the potential for excess trailing, soil compaction and/or erosion in harvest areas.

Assumptions Used

- Recreation demand (including that for overnight facilities) at the NRA will increase at an estimated rate of 3% per year over the next decade.
- Communities close to the NRA are affected by changes in NRA recreation use.
- Spending patterns and amounts for activity groups (e.g. non-beach day users, ORV recreationists, etc.) will remain similar to current patterns and amounts.

**Incomplete/
Unavailable
Information**

- Future demand for recreation opportunities at the Oregon Dunes NRA.
- Detailed community- and industry-specific information on economic effects of the alternatives.

ENVIRONMENTAL CONSEQUENCES ON ROADLESS AREAS

Direct and Indirect Effects

A roadless area is a large area of land (usually 2,500 acres or more) in which there are no developed roads or other significant human modifications (such as developed recreation facilities, buildings, utility structures, and so on). Construction of roads and facilities eliminates some amount of the roadless condition through the loss of environments and habitats. This, in turn, causes a loss of semi-primitive motorized and non-motorized recreational opportunities.

Presently, there are four Roadless Areas on the Oregon Dunes NRA--Woahink, Threemile Lake, Umpqua Spit and Tenmile. The combined area of these four areas is almost 24,000 acres. (See Appendix D for a detailed description of the roadless areas and the effects of the alternatives on each.)

In all alternatives except Alternative A, proposed roads or other developments would not eliminate large areas of currently existing roadless condition. This is because proposed roads and developments would be located on the edges of the roadless areas so would only reduce their sizes by a small amount. Even the cumulative effect of a number of small developments in different locations in a roadless area would not reduce acres substantially in these alternatives.

In Alternative A, a new road would be constructed almost the full length of the Umpqua Spit to provide access to a new interpretive site and recreation complex. This new road and new facilities would cut through the existing roadless areas, making the remainder too small to qualify as a roadless area. Umpqua Spit Roadless Area would therefore be eliminated, significantly reducing total roadless acreage.

In Alternatives D and E, existing roads and recreation facilities are shortened or eliminated. Because the roads (Siltcoos and Threemile Roads) no longer split some of the existing areas, one or more of them merge to form fewer, but generally larger, areas. In Alternative E, this reduces the number of roadless areas to 2 much larger roadless areas, increasing total roadless area acreage.

Figure IV-17, below, shows the size of each of the roadless areas and the total roadless area acreage in each alternative.

Figure IV-17. Acres of roadless area remaining.

Roadless Area	Existing	ALTERNATIVE							
		A	B	C	D	E	F(PA)	G	H
Woahink	4,885	4,815	4,835	4,885	9,600	12,150	4,835	4,785	4,960
Threemile Lake	4,605	4,510	4,530	4,605	*	*	4,505	4,555	4,605
Umpqua Spit ¹	2,275	0	2,260	2,275	2,280	*	2,280	2,280	2,275
Tenmile	7,530	7,220	7,285	7,480	7,395	9,025	7,375	7,260	7,510
TOTAL	19,295	16,545	18,910	19,245	19,275	21,175	18,995	18,880	19,350

¹ Figures for Umpqua Spit include 770 acres of recently patented private land.

* This roadless area has become part of the Woahink Roadless Area so acreage is shown there.

Cumulative Effects

From the standpoint of the individual roadless areas, the cumulative effects of individual construction projects has been discussed under direct and indirect effects.

Since roadless areas in the Oregon Coast Range are limited to lands owned or administered by the Forest Service, BLM and State of Oregon, cumulative effects on roadless areas are confined to actions taken by these government bodies. Effects would be extreme if all agencies were to reduce or eliminate roadless conditions on the lands they manage.

On the other hand, recent and potential actions taken to protect species such as the spotted owl and marbled murrelet may result in large areas returning to a roadless condition in the future. These habitat areas are so different from the roadless areas on the Oregon Dunes NRA, that it is probably not accurate to consider them as substitutes.

Mitigation Measures

The major mitigating measures for reducing environmental effects on the roadless areas is to not build roads or other developments in existing roadless areas. The other major action is to locate new roads and facilities on the edge of the roadless area so the effect is limited and the amount of roadless area lost is minimized. Both of these measures are instituted during the planning level decisionmaking and the effectiveness of each of them is very high.

Effects of Roadless Areas on Other Resources

Roadless areas meet the minimum requirements for future Wilderness consideration by Congress. Alternatives which eliminate roadless areas would reduce opportunities for Congress to add new areas to the National Wilderness Preservation System. The environmental effects on other components of the environment of maintaining roadless areas in a roadless condition are minimal. See Appendix D for more discussion of effects on the physical environment.

**Assump-
tions Used**

- No more roadless areas will be found.
- Road and facility construction will eliminate areas from being considered roadless until the evidence of those activities is essentially gone. This will probably be never for some areas.
- Human impacts within undeveloped areas will be concentrated on developed trails and campsites.

ENVIRONMENTAL CONSEQUENCES ON CULTURAL RESOURCES

Direct and Indirect Effects

Direct effects on cultural resources are related to the amount of land disturbance created by the construction of new roads, facilities, fish and wildlife enhancements and other improvements for each alternative. Land-disturbing projects have both positive and negative direct effects. The mitigation that follows projects is an important tool for identifying, studying and interpreting cultural resources. Conversely, when a land-disturbing project cannot be designed to avoid adverse effects on a cultural site, mitigation measures are required to protect artifacts. Scientific knowledge is gained from the data recovery associated with mitigation efforts but, because archaeological excavation is inherently a destructive process, opportunities for permanent "in place" site preservation are lost.

Alternatives with high levels of ground-disturbing activities, whether resulting from recreation, wildlife management or wetlands management (Alternatives A, B, D, F(PA), G, H) increase site discovery opportunities since these projects frequently occur in areas containing ancient archaeological evidence. The harm caused by construction or enhancement projects can be partly mitigated by archaeological "data recovery" excavations.

Increased recreational access and activities also causes resource damage that is difficult to control. For example, inadvertent damage to cultural resources may be caused by hikers or ORV traffic cutting across ancient shell middens. Damage may also result from deliberately planned vandalism, artifact collecting or site looting. Thus alternatives which increase recreation use substantially (Alternatives A, B, G) would impact cultural resources more than alternatives which maintain (Alternatives C, F(PA), H) or decrease (Alternatives D, E) recreation use.

Alternatives A, B, D, F(PA), G and H which include efforts to control or eradicate European beachgrass would re-initiate dune movement which could, in turn, expose previously stabilized sites and cover exposed shell middens and historic remains. These sites would be at risk from accidental recreational damage and would be exposed to artifact hunters. Localized beachgrass control associated with RNA allocation in Alternatives B, C, D, E, F(PA) and H might also uncover cultural sites. However, recreation projects and other land-disturbing activities would be limited within RNAs so long-term site preservation would be enhanced and mitigation concerns would be alleviated.

Alternatives B, D, E, F(PA), G and H which would recommend nomination of streams and rivers as Wild and Scenic offer protection of cultural resources because they restrict the level of development that could occur within the riparian corridor. However, cultural sites located within the stream/river corridors would still be vulnerable to damage from uncontrolled recreation activities such as off-trail hiking and artifact collecting and site looting.

Indirect effects may result from human-created changes in the landscape that expose and endanger previously hidden and protected cultural resources. For example, recreation or wildlife habitat improvements that denude vegetation near a stream and increase streambank erosion could destabilize nearby sites such as prehistoric shell middens and contribute to their loss or destruction.

All alternatives have some level of indirect effect on cultural resources although precise prediction is difficult without project and site specific information. In general, Alternatives A, B, D, F(PA) and G which include high levels of land disturbance contribute to the destabilization and exposure of sites and pose the greatest indirect threat to cultural resources.

Cumulative Effects

Because the identified cultural resource base is very small, cumulative effects must be projected based on current site discovery rates and the amount of proposed development during the planning period. Alternatives that emphasize recreation improvements and vegetation manipulation/habitat enhancement have the greatest cumulative effect on cultural resources. These alternatives will have the highest site discovery rates and provide the greatest amount of scientific information through project mitigation work. In the short-term, these alternatives enhance opportunities for identification, study and interpretation of cultural sites. In the long-term, the pace of development and subsequent site mitigation needs could outstrip project budgets and work against the cumulative preservation interests of the NRA's cultural resource base.

Mitigation Measures

Mitigation measures for land disturbing projects affecting cultural resources would include project redesign, site avoidance, placing filter cloth or fill on top of sites, archival documentation, photography and removal of historic buildings, and archaeological data recovery at prehistoric sites. Mitigation measures would be site specific and based on consultation and agreement among the Forest Service, the Oregon State Historic Preservation Office, the federal Advisory Council on Historic Preservation and, when appropriate, the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians.

However, cultural resources are a fragile and non-renewable resource with important values to the scientific/history community, American Indian peoples, and the historic preservation-oriented public. To these groups, the direct, indirect and cumulative effects of land disturbing projects on irreplaceable cultural resources and National heritage sites cannot be entirely mitigated through any of the means described above.

Effects of Cultural Resources on Other Resources

Recreation

- The presence of cultural resource sites in areas set aside for recreation facilities, or trails may require moving the projects to other locations or redesigning them to avoid causing adverse impacts. This could delay the project and create adverse environmental consequences if quick (seasonally-constrained) implementation is required.
- Identification, study and interpretation of Oregon Dunes NRA cultural resources would be an important tourist attraction and generate revenue for local economies. Interpreted coastal shell middens, American Indian villages, and historic sites associated with the settlement and maritime history of western Oregon provide unrivaled opportunities for public outreach and education on National Forest lands.

Plant Communities and Wildlife Habitats

- The presence of cultural resource sites in areas set aside for plant and/or wildlife habitat enhancement projects may require moving projects to other locations or redesigning them to avoid causing adverse impacts.

Fish Habitat

- Presence of cultural resource sites in areas set aside for fish habitat enhancement projects may require moving projects to other locations or redesigning them to avoid causing adverse impacts.

Assumptions Used

- Currently known cultural resources on the Oregon Dunes NRA are representative of the resource base at large.
- Land-disturbing projects which disturb cultural resources cause irreversible damage to non-renewable cultural resources. The amount and kind of damage to cultural resources is dependent on the level of land disturbance.
- Some forms of recreation and public use of the Oregon Dunes NRA (e.g., hiking, fishing, ORV riding) are difficult to control and contribute to archaeological/historical site resource damage, artifact theft and site vandalism.
- The amount of artifact collecting and site looting will accelerate over time as more sites are discovered and the public is made aware of these finds in the local media and Forest Service public outreach/education projects.

**Incomplete/
Unavailable
Information**

- Historic information specifically tied to places and sites on the Oregon Dunes NRA, especially information gathered through oral interviews with area "old timers" and local historical experts.
- Cultural resource site records for the NRA.
- Non-project related inventory data.
- Ethnographic information about the Coos, Lower Umpqua and Siulaw Indians, especially in regards to ancient village sites and traditional use areas on the Oregon Dunes NRA.
- Post-glacial geological information about the Dunes, especially as it relates to past climates and climatic change, opening and closing of estuaries and rivers by dune movement and sea level fluctuations.
- Post-glacial natural history information about the Dunes, especially as it relates to plant succession, wildlife range and fisheries habitat.
- Effects of modern vegetation manipulation and other activities on cultural resources.
- Information about how to stabilize and protect sites such as shell middens from the elements and public.
- Type and extent of artifact collecting, site looting and vandalism at cultural sites.
- Effective methods of interpreting the Oregon Dunes NRA's cultural history for the public without risking site damage and destruction.

ENVIRONMENTAL CONSEQUENCES ON OTHER RESOURCES

Direct and Indirect Effects

Human and Community Development Activities

The Oregon Dunes NRA participates in 2 U.S. Department of Labor funded programs designed to provide employment and training opportunities. The Umpqua Training and Employment Program serves economically disadvantaged young people, aged 15 to 18. The NRA typically provides training, supervision and employment to 4-5 individuals under this program. The Senior Conservation Employment Program serves individuals over 55 years of age. The NRA typically employs and trains 6 people under this program. Since both programs are funded independently of the U.S. Forest Service, the alternatives being considered would not affect these programs.

The Oregon Dunes NRA contributes both directly and indirectly to community development activities. Direct contributions result from NRA participation in community-sponsored programs and ventures intended to promote development. Indirect contributions result from NRA programs which take place on Forest Service lands within the NRA, but create business opportunities and foster tourism in local communities (see Environmental Consequences on Social and Economic Setting, Chapter IV).

Minorities and Women

The primary effect of the alternatives on minorities and women would be through changes in job and outdoor recreation opportunities. Job opportunities would vary in terms of Forest Service jobs and contracts for goods and services, and also, in terms of local jobs created in response to NRA outputs, payments to counties and expenditures. Forest Service policies ensure employment and contracting opportunities for people without regard to race, color, religion, national origin, sex, age or physical/mental disability. Although these policies would continue under all alternatives, the number of agency and contracting jobs would vary with program emphases and associated funding levels on the NRA (See Environmental Consequences on Social and Economic Setting, Chapter IV).

Recreation opportunities on National Forest lands are also available to people without regard to race, color, religion, national origin, sex, age or physical/mental disability. The types, amounts and locations of various recreation opportunities at the Oregon Dunes NRA would vary depending on the alternative implemented (See Environmental Consequences on Recreation, Chapter IV).

American Indian Religious Freedom

The primary use of the NRA lands by American Indians for religious purposes appears to have been to develop unique, individual links with the natural world. Although no continuing religious practices have been identified on the Forest, several sites which were once important to the area's native inhabitants are known (Beckham et al. 1982). Protection of these sites and cooperation with Indian Tribes to identify other sites would continue under all alternatives.

Prime Farmlands, Wetlands and Flood Plains

There are no identified prime farmlands on the Oregon Dunes NRA. Prime farmlands off the Oregon Dunes NRA would not be affected by activities proposed in any of the alternatives. Flood plains and wetlands would be protected in all alternatives by management requirements to meet Executive Orders 11990 and 11988. Roads, campground and picnic areas and facilities would not be built in these areas. Standards and guidelines would protect and enhance wildlife habitat, plant habitat, visual quality and water quality in wetlands and estuaries on the NRA. Treatment of vegetation to favor early succession stage vegetation over late succession stage vegetation in large areas of wetland in Alternatives D, F and H would slow the progression of wetlands into drylands in the treated areas (see Environmental Consequences on Plant Communities and Wildlife Habitats, Chapter IV). This would have implications for future as well as current management of the NRA.

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short-term use of the land includes the day-to-day and even year-to-year activities that visitors and Forest Service managers engage in at the Oregon Dunes NRA. It includes both activities that physically remove resources from the land, such as hunting, fishing, mushroom gathering and berry picking as well as activities that do not, such as scenery viewing, hiking, photography and ORV riding. Short-term actions also include management activities such as facility construction and vegetation management often performed to permit, encourage or discourage other activities, such as those noted above.

Long-term productivity refers to the land's continuing ability to produce both commodities (such as fish, wildlife and plant products), as well as amenities (such as scenery and recreation opportunities) for future generations. This ability depends on management practices and uses that do not impair soil productivity or water quality to the point they are no longer capable of providing habitat; alter the natural landscape beyond its ability to recover; or impair geologic features to the extent that they lose identity. In creating the Oregon Dunes NRA, Congress specifically recognized its unique recreational, scenic, scientific and historic values. NRA management decisions must, therefore, be based on the land's continuing capability to provide these values rather than on urgency, short-term economics or short-term needs.

- ORV use off routes designated and maintained for that purpose is a short-term use, but it affects long-term soil productivity through loss of vegetation, erosion and rutting (Alternatives A, B, C, D, F(PA), and G).
- The continued spread of non-native vegetation and the resulting accelerated spread of native vegetation affects the NRA's long-term ability to provide the unique recreation, scenic and scientific values for which it was established (All Alternatives)
- The continued decline of surface water levels in portions of the NRA affects the long-term productivity of the area by reducing habitat for some species of fish, wildlife and plants; as well as by reducing opportunities for some types of outdoor recreation, such as fishing, waterfowl viewing and hunting (All Alternatives).
- The use of ORVs in some areas (such as Tree Island #3) is temporary in nature, but has long-term effects on unique scenic and geologic features (tree islands) (Alternatives A, C, and G).

UNAVOIDABLE ADVERSE EFFECTS

Implementing any alternative would result in some adverse environmental effects that cannot be avoided. Standards and guidelines and mitigation measures are intended to keep the extent and duration of these effects within acceptable levels, but adverse effects cannot be completely eliminated. The following adverse environmental consequences would be associated to some extent with all alternatives.

Recreation

- Loss or reduction of some opportunities due to development and/or management for other recreation opportunities or other resource objectives.

Fish/Wildlife/Plant Habitat

- Loss or reduction of habitat for some species as a result of declining surface water levels in some portions of the NRA and/or competition from non-native species.
- Loss or reduction of habitat for some plant species as a result of ORV use, facility development, and/or ecological changes resulting from non-native species.
- Displacement of wildlife when their habitat is disturbed by vegetation management; road, trail or facility development; or recreation use.

Scenery

- Reduction in the unique scenic quality of the NRA as a result of vegetation spread.

Watershed

- Contamination of water sources due to increased human use of the NRA.
- Loss of soils from vegetated areas resulting from ORVs operating off of designated routes.

Cultural Resources

- Disruption of prehistoric or historic evidence of human occupancy on the NRA resulting from road, trail and facility development, habitat management and vegetation management.

Unavoidable Adverse Effects

Air Quality

- Short-term reduction in air quality from dust, smoke, and vehicle emissions resulting from construction of roads and facilities, recreation use and wildlife habitat management.

Fire Management

- Increase in fire hazard from increasing vegetation coupled with high levels of dispersed recreational use.

IRREVERSIBLE OR IRRETRIEVABLE RESOURCE COMMITMENTS

Irreversible resource commitments are actions which either deplete a non-renewable resource or disturb another resource to the point that it cannot be renewed within 100 years. Examples of irreversible commitments are the disturbance of cultural sites, the loss or destruction of a significant geologic feature, or the loss of critical habitats.

Irretrievable resource commitments are opportunities for resource use lost for a period of time because that resource is being used for some other, generally incompatible, purpose. Examples of irretrievable resource commitments are the loss of developed recreation opportunities in areas where wildlife management is the emphasis or, conversely, the loss of wildlife habitat opportunities in highly developed recreation areas. Irretrievable commitments may not extend forever, because they can be changed through changes in management direction.

Irreversible Resource Commitments

Standards and guidelines designed to protect resources that could be irreversibly affected are included in all the alternatives. Nevertheless, the potential for irreversible losses remains and the primary ones are noted below.

- Soil disturbing activities primarily related to recreation development and wildlife habitat management could result in irreversible losses of cultural resources (All Alternatives).
- Continued ORV riding at Tree Island #3 will cause soil erosion and undermine vegetation, which will eventually result in the irreversible loss of a unique geologic feature, a tree island (Alternatives A, C, G).
- Extracting minerals, such as high silica content sand, is an irreversible commitment since the minerals are no longer available for use (All Alternatives).
- The use of fossil fuels to manage the NRA and expended by recreationists getting to and at the NRA is an irreversible resource commitment. Alternatives encouraging higher levels visitation, management, and ORV riding would cause higher consumption of fossil fuels (Alternatives A, B, C, F(PA), G).
- Loss of soil resources resulting from ORVs operating off designated routes in vegetated areas is an irreversible condition (Alternatives A, B, C, D, F(PA), G).

Irreversible or Irretrievable Commitments

- Contamination of surface and/or groundwater is an irreversible commitment that is more likely under alternatives that promote higher levels of recreation use, especially dispersed recreation use by ORVs (Alternatives A, C, F(PA), G).

Irretrievable Resource Commit- ments

All 8 alternatives contain irretrievable resource commitments. They are unavoidable because it is impossible to manage resources for any purpose without precluding the opportunity to use them for some other purpose. Some of the major irretrievable resources commitments included in the alternatives are listed below.

Recreation

- Managing areas of the NRA for recreation reduces opportunities to manage them for wildlife or plant habitat and for some types of research.
- Managing some portions of the NRA for developed recreation precludes... opportunities to manage them for dispersed recreation.
- Managing some portions of the NRA for non-motorized forms of recreation precludes opportunities for ORV use of these areas.
- Increasing recreation access reduces opportunities for more quiet, remote, solitude-dependent types of recreation experiences.

Fish/Wildlife/Plant Habitat

- Managing certain areas primarily as habitat precludes opportunities for some forms of recreation and some types of research.
- Managing certain areas (i.e., meadows) as early seral stage habitats precludes opportunities for letting them evolve into later seral stage habitats.
- Managing fish habitats to benefit certain species reduces opportunities to benefit other species.

Wetlands

- Managing areas as wetland habitat precludes opportunities to manage them for some types of recreation, for species not adapted to wetlands, and for some types of research.

Research Natural Areas

- Managing areas primarily for research eliminates opportunities to manage them for some types of recreation (e.g., ORVs) and for some types of habitat.

Wild and Scenic Rivers

- Managing NRA streams as wild or scenic rivers would preclude opportunities for some types of recreational development; for some types of habitat management; and for expenditure of federal funds on activities outside the NRA that would detract from the values for which the stream was designated.

Minerals

- Allowing mineral entry in the NRA buffer in the Horsfall area could result in public lands claimed for mineral resources passing into private ownership and eliminate opportunities to manage them for public use.

Water

- Continued pumping from the Dunes Aquifer and the increase in vegetation could reduce or eliminate opportunities to manage surface water for scenic, recreational, and habitat purposes.

CONDITIONS UNCHANGED BY ALTERNATIVES

There are some conditions on the NRA which would not be affected by implementation of any alternative.

- The spread of vegetation will outstrip efforts to arrest it during this planning period in all alternatives.
- The decline in surface water levels in some portions of the NRA will continue in all alternatives.
- The potential for mineral entry in the NRA buffer (Horsfall area) and the potential for private land patents in accordance with provisions of the 1872 Mining Act will continue in all alternatives.

CONSISTENCY WITH OTHER PLANS AND POLICIES

Plans and policies of various federal, state, county and city agencies were reviewed for consistency with alternatives described in the Final Environmental Impact Statement (FEIS) for the Siuslaw National Forest Land and Resource Management Plan (USFS 1991). Alternatives described in this FEIS were also reviewed for consistency with other plans and policies. All alternatives were determined to be consistent with the 1980 Resource Planning Act, National Clean Air Act, the policies of Oregon Department of Forestry, and the policies of the Oregon Department of Environmental Quality (see USFS 1991 for detailed discussion).

The following plans and policies will be addressed more specifically.

Plant/Fish/ Wildlife Habitat

In general, no actions are proposed in the alternatives that would conflict with management plans of ODFW, the U.S. Fish and Wildlife Service, the Oregon Natural Heritage Program or the Siuslaw National Forest Land and Resource Management Plan. Existing populations of all proposed, endangered, threatened and sensitive plant species would not be jeopardized in compliance with Forest Service policy (FSM 2670).

Oregon Department of Fish and Wildlife

Fish - ODFW recently completed a management plan for the Tenmile basin (Abrams et al. 1991), of which the Oregon Dunes NRA forms the most western portion. The Plan calls for cooperation between ODFW and the Oregon Dunes NRA to enhance fish habitat, post signs, determine access needs and angler use on Tenmile Creek, and consider a hatchery program for steelhead and coho salmon in Saunders Creek. The Plan also calls for protection of the Tenmile estuary.

None of the alternatives include the hatchery program on Saunders Creek, while only Alternatives D and F(PA) call for substantial developments to enhance angling in the Spinreel area along Tenmile Creek.

Wildlife - The goals of ODFW for wildlife habitat are expressed according to species. Only those species found on the Oregon Dunes NRA are discussed below.

Bald Eagle - ODFW requested that all important feeding areas be identified and protected. The estuaries of Siltcoos River and Tahkenitch and Tenmile creeks provide valuable foraging habitat for bald eagle. None of the alternatives would reduce the availability of this habitat although alternatives which are expected to increase recreation levels substantially (Alternatives A, B, G) may slightly reduce the suitability of estuary habitat for foraging eagles.

Snowy Plover - ODFW goals for snowy plover are to maintain and enhance habitat on the Oregon Dunes NRA and prevent disturbance to breeding plovers. All of the alternatives, except C, protect snowy plover habitat and reduce disturbance to nesting snowy plovers. Some disturbance would still occur in all alternatives; disturbance would be higher in alternatives which substantially increase use of the NRA (Alternatives A, B, G).

Black Bear - ODFW would like to maintain a huntable population of black bear. Coastal Oregon, and the Oregon Dunes NRA in particular, currently supports a high black bear population although exact numbers are not known. All alternatives are expected to maintain huntable bear populations. Alternatives which emphasize wildlife habitat management (Alternatives D, F(PA), H) would have more opportunity to manage specifically to increase bear populations.

Black-tailed Deer - ODFW specifies that they would like to maintain a black-tailed deer population of approximately 31,000. Numbers of deer residing on the NRA are not currently known and no surveys are planned. However, all alternatives are expected to at least maintain existing deer populations. Alternatives which emphasize wildlife habitat or wetlands management (Alternatives D, F(PA), H) would have more opportunity to specifically manage black-tailed deer populations.

Special Habitats - All alternatives would meet ODFW goals by maintaining special habitats. Special protection to these habitats would be provided in some alternatives through more restrictive standards and guidelines.

U.S. Fish and Wildlife Service Recovery Plans

Aleutian Canada Goose - All alternatives would meet recovery plan objectives for migratory and wintering habitat for the Aleutian Canada goose. Alternatives which emphasize wetlands management (Alternatives D, F(PA), H) would increase suitable habitat for this species.

Bald Eagle - All alternatives would meet recovery plan objectives of identifying and protecting important feeding areas. Alternatives which are expected to increase recreation levels substantially (Alternatives A, B, G) may slightly reduce the suitability of estuary habitat for foraging eagles.

California Brown Pelican - All alternatives would meet recovery plan objectives of identifying and protecting important roosting/resting areas. Many stretches of beach, sand spits, and estuaries on, or adjacent to the NRA provide fall roosting habitat for pelicans. Alternatives with few miles of "remote" beach may reduce the suitability of this habitat for pelicans.

Cultural Resources

All actions would comply with federal historic preservation law and regulations, including Executive Order 11593, Section 106 and 110 of the National Historic Preservation Act of 1966, the American Indian Religious Freedom Act, and the Archaeological Resources Protection Act of 1979, as amended.

Cultural resource inventory on the NRA would follow the procedures outlined in the Forest's programmatic agreement with the Oregon State Historic Preservation Office.

Recreation

The State Comprehensive Outdoor Recreation Plan (SCORP) is prepared every 5 years by the Oregon Department of Parks and Recreation. It reports current and projected demand for a variety of outdoor recreation activities and ROS settings within several regions comprising the entire state. It is the most comprehensive and reliable information dealing with future demand for recreation activities and settings at the NRA.

All alternatives in this FEIS provide varying amounts of 4 ROS classes for which SCORP has projected demand in the year 2000. These demand projections are not disaggregated beyond the National Forest level. On a proportional basis, the NRA would meet its share of the Siuslaw National Forest's projected demand in all alternatives except Alternative E.

Transportation - U.S. Highway 101

Oregon Department of Transportation (ODOT) is currently preparing a major plan for U.S. Highway 101. As the major transportation artery serving the NRA, future plans for the highway are very important to future visitation, resource conditions, and management at the NRA. Significant opportunities for coordination and cooperation to meet joint objectives exist between these 2 planning efforts. As concurrent planning progresses, the Forest Service will continue to monitor and remain involved in the Highway 101 planning effort in order to identify the opportunities and consequences for the NRA associated with this project.

Watershed

Protective measures for streams and soils within the NRA are generally more restrictive than required by the Oregon Forest Practices Act, or the Department of Environmental Quality. Estuaries at the mouth of the Siltcoos River, Tenmile Creek and Tahkenitch Creek are closed to motor vehicle use in accordance with Oregon Administrative Rules (OAR) 1414-84-020, 1414-84-030, and 1414-84-040 respectively.

City and County Plans

A complete discussion of how city and county plans are formulated to address Oregon law is presented in Chapter IV of the Forest Plan FEIS. County comprehensive plans must address 19 goals established by the Land Conservation and Development Commission (LCDC). The alternatives in this FEIS were compared to the LCDC-approved comprehensive plans for Lane, Douglas, and Coos counties, the counties in which NRA lands lie. The uses and activities proposed in the alternatives were consistent to the maximum extent practicable with the enforceable policies contained in the county comprehensive plans.

Some alternatives (B, D, E and H), including the preferred F(PA) were found to be not consistent with a Coos County advisory policy (included in the Coos County Comprehensive Plan) opposing "... new restrictions on the use of off-road vehicles on public lands in unincorporated Coos County unless the Board of Commissioners finds that such are necessary to protect the health, safety and welfare of its citizens." The Forest Service considered this advisory policy, but felt it appropriate and necessary to propose additional ORV restrictions in some alternatives (including the preferred) in order to more broadly address statewide planning goals 5, 17, and 18; provisions of the Endangered Species Act; and alternative recreation opportunities as identified in the State Comprehensive Outdoor Recreation Plan (SCORP).

The Oregon Coastal Management Program

The Federal Coastal Zone Management Act (CZMA) of 1972, as amended, established a program to encourage states to adopt coastal management programs which would meet national standards. A section of the CZMA requires that "Each Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." [Subsection 307(c)(1)] Although Federal lands are excluded from the boundaries of the coastal zone, the "affecting activities" provision requires federal agencies to examine their actions for both direct, immediate impacts, cumulative impacts and indirect effects that may occur at a later time and at a distance from the action.

The LCDC has administered the Oregon Coastal Management Program (OCMP) since 1975. The federal government officially recognized and approved that program in 1977. The policies of the OCMP include the 19 statewide planning goals, all acknowledged city and county comprehensive plans and land use regulations and the statutory authorities of a variety of state agencies. These statutory authorities are included in the appendix of the OCMP document. Federal activities directly or indirectly affecting the coastal zone must be consistent "to the maximum extent practicable" with all applicable and mandatory OCMP policies, but advisory policies need only be considered. The term "to the maximum extent practicable" means that a federal agency's activities must be consistent with federally approved state coastal zone policies whenever the agency has discretion under federal law to abide with state policies. The CZMA does not, however, impose a higher duty on federal agencies than a state requires of its own agencies.

Oregon Revised Statutes 197.180 requires state agencies to undertake their activities in compliance with the goals and in a manner compatible with acknowledged plans and land use regulations. So, if an examination of the activities included in the alternatives reveals compliance with the goals, compatibility with acknowledged city and county comprehensive plans and land use regulations, and conformance with the various state agency statutory authorities within the OCMP appendix, consistency with the OCMP would be demonstrated.

In summary, the CZMA requires that the stricter standards, either state or federal, be used to govern what activities may be allowed, but state standards are only applicable when a federal agency chooses to support or conduct an activity directly or indirectly affecting the coastal zone. The CZMA does not require federal agencies to initiate activities to be consistent with more permissive state policies.

Portions of Oregon's coastal zone in Douglas, Lane and Coos counties may be directly or indirectly affected by activities such as road construction, fish and wildlife habitat improvements, recreation development and land acquisition. These activities can affect water quality, water quantity, living resources of water, water aesthetics, and water surface area (page 17 of the Oregon Coastal Management Program). The alternatives would include all of the above activities and effects on the environment, which are discussed in earlier sections of this chapter. Specific affects in localized areas of the NRA will be identified and documented in project-level environmental assessments. All necessary permits and/or exceptions to OCMP goals will also be identified in these project-level documents. Required permits and goal exceptions will be obtained by the Forest Service before projects are implemented.

The comprehensive plans and land use regulations of the 3 counties have been acknowledged by the LCDC as meeting the requirements of the goals. These plans have been reviewed by the Forest Service. The effects predicted for the alternatives have been compared with the county comprehensive plans and have been found to be consistent to the maximum extent practicable at the programmatic level. Since the county plans have been found by LCDC to comply with the goals, consistency with the goals is assumed (to the extent LCDC required these plans to comply with the goals in the first place).

Figure IV-18. LCDC Goals and Discussion

LCDC STATE-WIDE GOAL	DISCUSSION
1. Citizen Involvement	Same as FEIS with amendments for NRA specifics.
5. Open Spaces, Scenic and Historic areas and resources (including federal Wild and Scenic, State Scenic Waterways, and designated state trails).	NRA FEIS alternatives are consistent to the maximum extent practicable (with exception as noted above in text)
6. Air, Water, and Land Resource Quality	Tiering to the Forest Plan, all NRA FEIS alternatives contain provisions for the protection of air, water and land.
8. Recreation Needs	Under all alternatives except E, the NRA would meet its proportional share of the demand projected for the Siuslaw N.F. by SCORP. All alternatives would provide a diverse mix of recreation opportunities.
9. Economy of the State	All alternatives would contribute to the economy of the State of Oregon. Alternatives A, B and G would contribute more than current management. Alternatives C, D, F(PA) and H would contribute amounts similar to current. Alternative E would contribute less than current amounts.
16. Estuarine Resources	All of the alternatives contain provisions for the protection of estuarine resources.
17. Coastal Shorelands	The alternatives would affect coastal shorelands by providing for varying levels of recreation, plant and wildlife habitat and other resource uses.
18. Beaches and Dunes	The alternatives would affect beaches and dunes by providing for varying levels of recreation, habitat and other resource uses.
19. Ocean Resources	None of the alternatives would have any significant effects on ocean resources.

The LCDC has left some provisions of the statewide planning goals to be administered by state agencies rather than local governments. These provisions are discussed below.

The Forest Practices Act administered by the Oregon Department of Forestry (Goals 5 and 17 and ORS 527.610 to 527.730)

All NRA practices used to implement the alternatives will meet or exceed the Forest Practices Act.

Fish and Wildlife policies administered by the Oregon Department of Fish and Wildlife (Goals 16, 17, and 18 and ORS 496.012 to 496.162 and ORS 506.105 to 506.201).

All alternatives contain provisions to provide for the habitat needs of species identified on the state of Oregon Threatened and Endangered Species list.

Air and Water Pollution Control statutes administered by the Oregon Department of Environmental Quality (Goal 6 and ORS 468.275 to 468.345 and ORS 468.700 to 468.775).

The Forest Service complies with these requirements by obtaining permits and providing data as needed. For example, any slash burning conducted as a part of implementing an alternative will be authorized by DEQ. Pollution control facilities will be operated according to DEQ standards and new facilities would be approved by DEQ before construction.

Regulations of Mining and Drilling administered by the Department of Geology and Mineral Industries (ORS Chapters 516, 517 and 520).

Forest Service permitted operations are required to obtain necessary permits before they commence. All necessary permits will be obtained.

Fill and Removal administered by the Division of State Lands (Goals 16, 17 and 18 and ORS Chapters 274, 517, and 541)

All required DSL permits (or exceptions from OCMP goals) for fill and removal operations will be obtained by the NRA before project work is undertaken and projects will be modified accordingly to comply fully with statutory requirements.

Ocean Shore Regulations and Scenic Waterways administered by the Parks and Recreation Department (Goals 8, 16, 17, and 18 and ORS Chapter 390).

Any activities in the Ocean Shore zone or affecting State Scenic Waterways will be coordinated through discussions with the Oregon Department of Parks and Recreation. Any required permits (or exceptions from OCMP goals) will be obtained before commencing project work.

Regulation of water use administered by the Water Resources Department (WRD) (ORS Chapters 536 and 543)

Forest Service water use, such as for recreation facilities and wetland projects, will comply with applicable WRD water rights, permitting and reporting requirements.

Consistency With Other Plans and Policies

Site specific actions may have to be examined in more detail before a final determination of consistency with the OCMP can be made. Project implementing actions will be examined to determine if they have the potential to directly or indirectly affect Oregon's Coastal Zone. If the affecting activity test is met, a site specific consistency determination will be made. This determination will address the goals, the acknowledged plans, and the statutory authorities. If exceptions to OCMP goals are required to achieve project objectives, the necessity will be demonstrated in project-level environmental documents and exceptions obtained in accordance with DLCD guidelines (OAR Ch. 660, Div. 4) This approach is consistent with the OCMP.

